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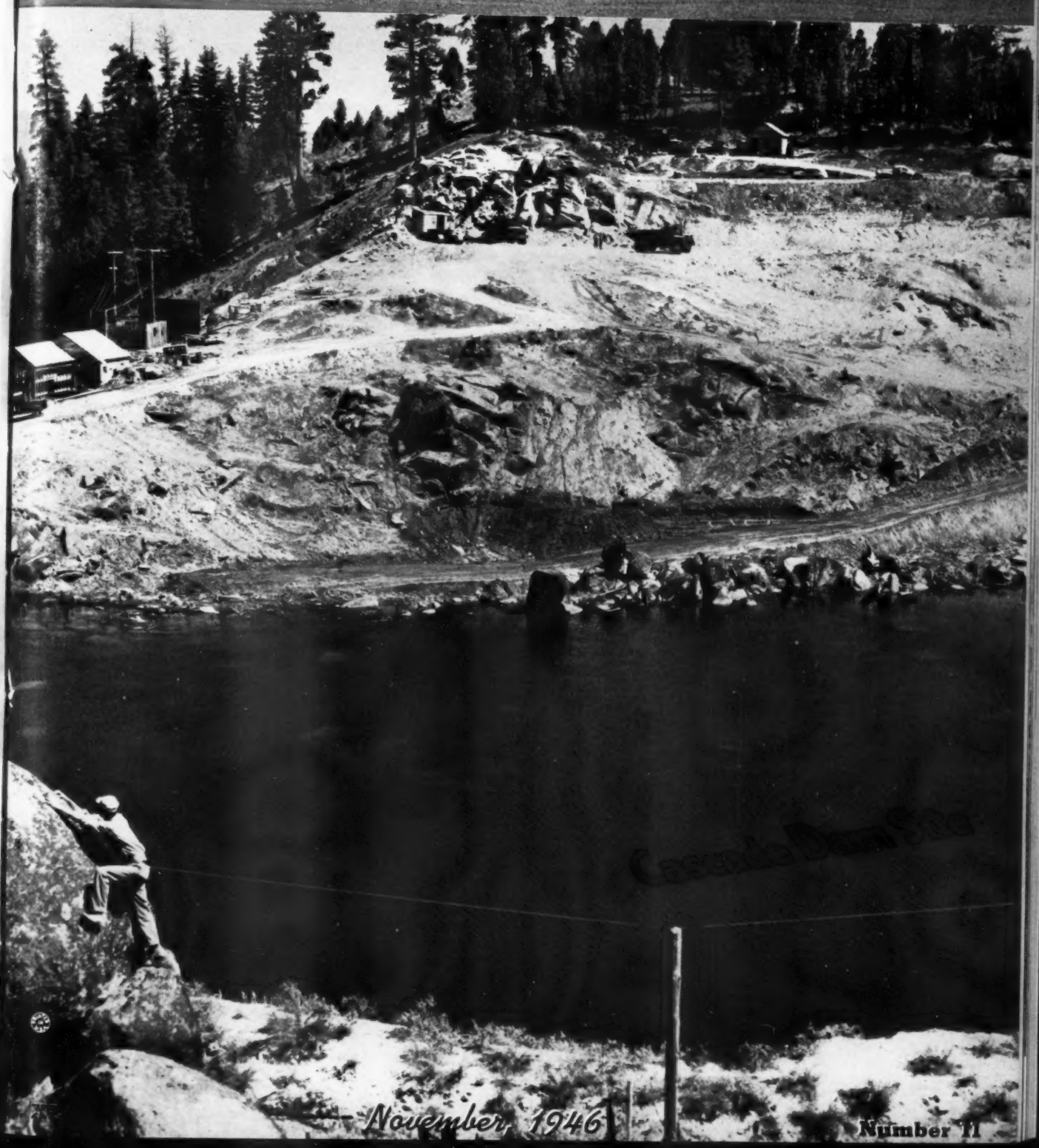
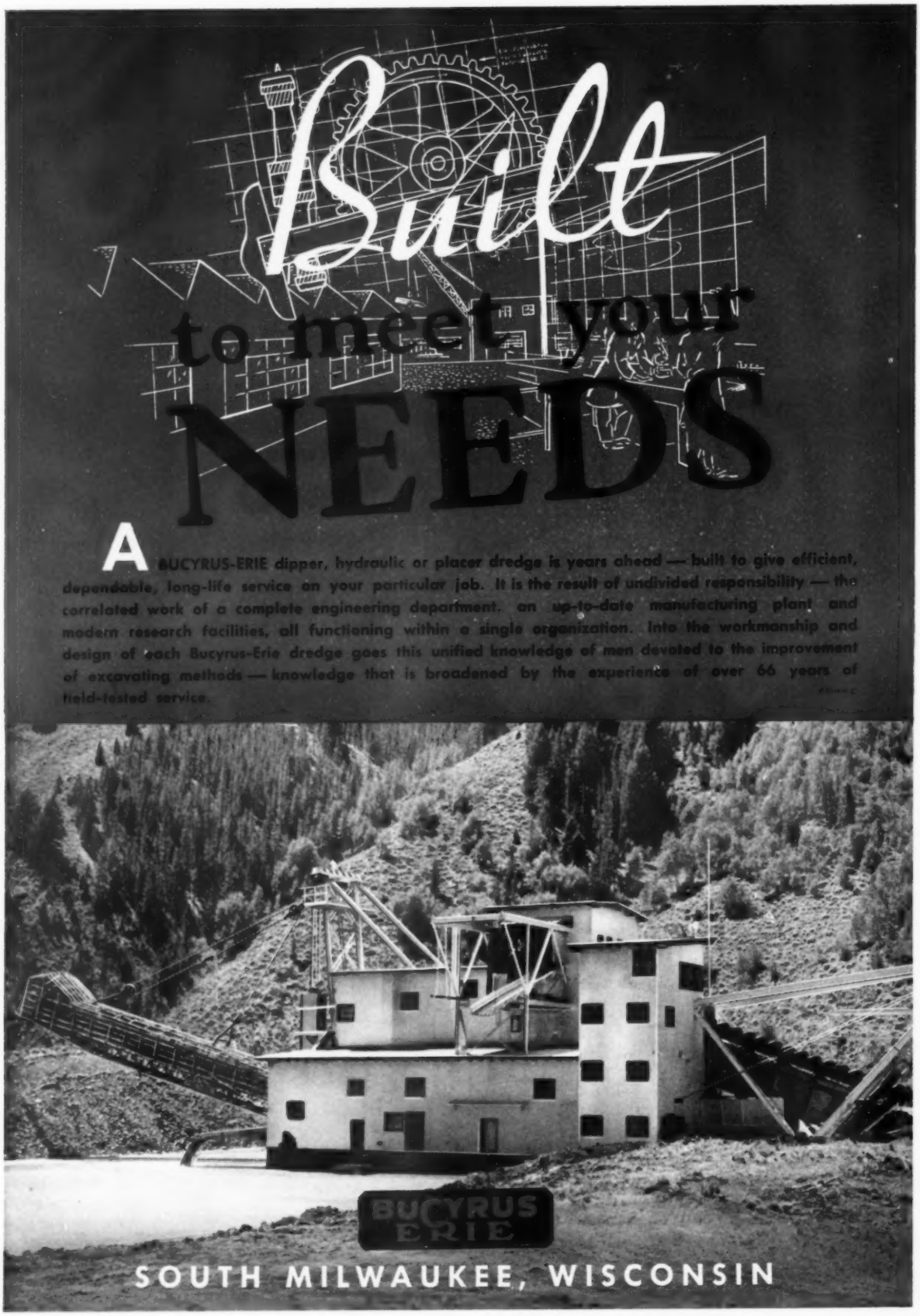


November 1946 Number 11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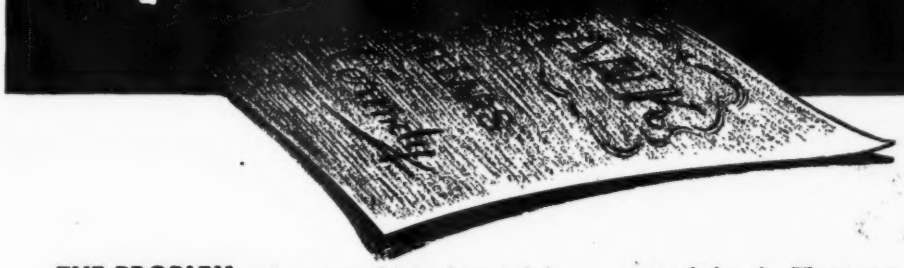


THE PROBLEM— A recent CAA airport job called for clearing and grading 350 acres and installing drainage structures and electrical conduits. It involved handling 4,000,000 cu. yds. of material which ran from 60 to 90% rock. This work had to be done within a 300-day time limit.

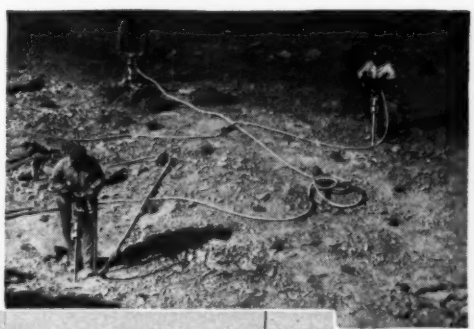
THE PENALTY— $3500.00 for each day that the work exceeded the 300-day limit.

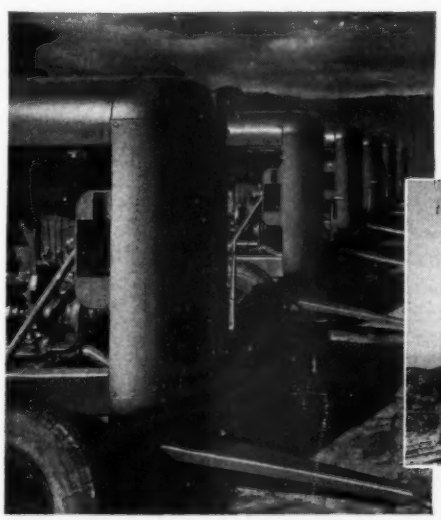
THE SOLUTION— The contractor, to protect himself against this penalty, used I-R rock drilling equipment.

Forty-six FM-2 wagon mountings equipped with X-71WD deep hole machines did the bulk of the drilling. Small outcroppings that occurred outside the main drilling areas were removed by 18 easy-holding, fast-drilling, I-R Jackhamers.

Thirteen K-500 Mobil-Air Compressors supplied most of the air. These were selected because the patented Drill-More Regulator on the K-500 provides up to 15% faster drilling and uses up to 40% less fuel to do an average drilling job. The drilling ability of the FM-2 Wagon Drills and the Jackhamers, teamed with the efficiency of the K-500 Mobil-Airs, enabled the contractors to move more than 45,000 cu. yds. of material a day. This kept him well ahead of schedule.

MORAL— Put the high standard of performance and the dependability of I-R rock-drilling equipment to work on your new jobs. You'll get them done faster and at lower cost.





Left—Low-cost air was provided by K-500 Mobil-Air Compressors equipped with the patented, fuel saving Drill-More Regulator.

Above—Small, out-of-the-way areas were drilled quickly and efficiently with I-R Jackhamers.

Left—The deep-hole drilling power of FM-2 Wagon Drills kept the big shovels and dirt-moving equipment constantly at work.

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Across this section of the North Fork of the Payette River, near Cascade, Idaho, the Bureau of Reclamation is constructing Cascade Dam, an earth and rock fill structure which will store 700,000 acre-feet of water for use in the Boise and Emmett valleys.

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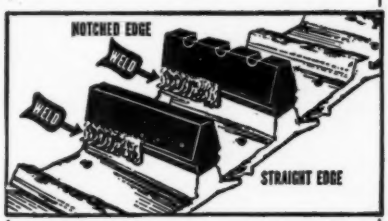

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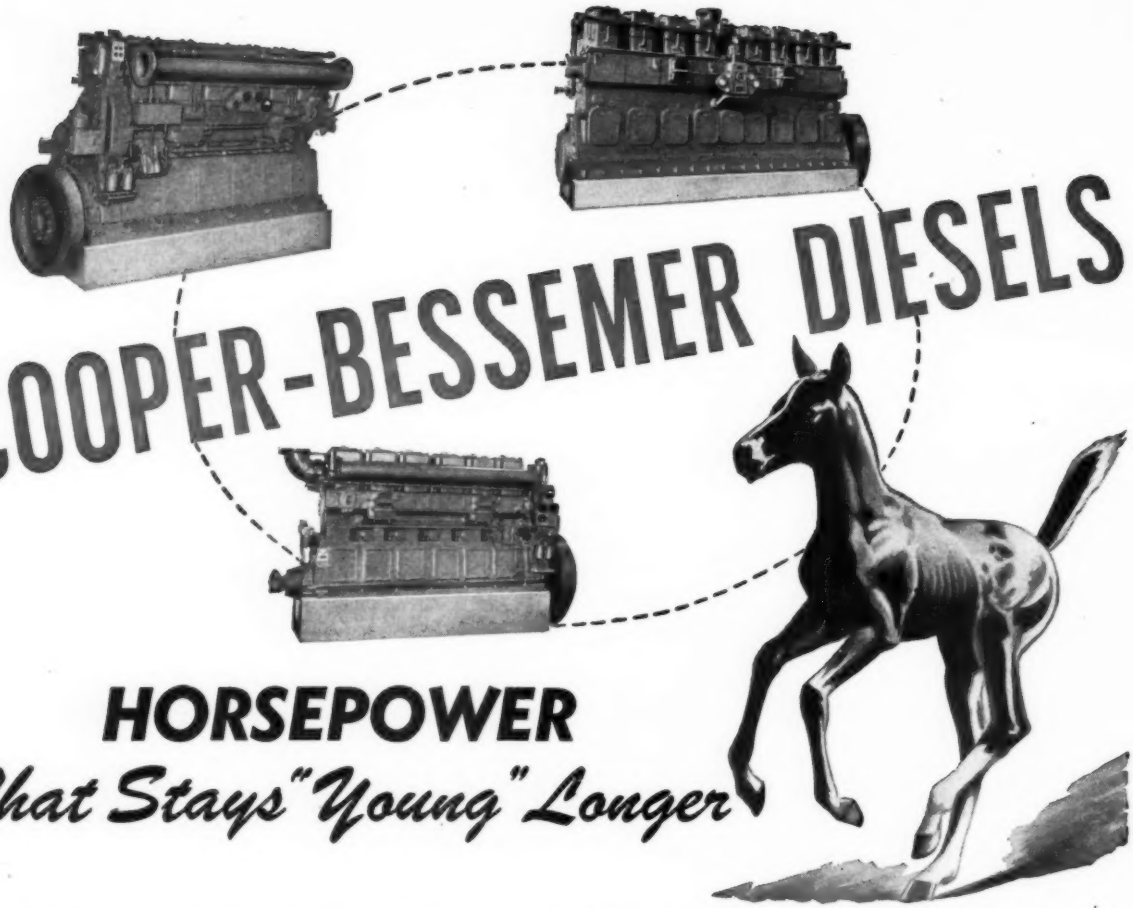

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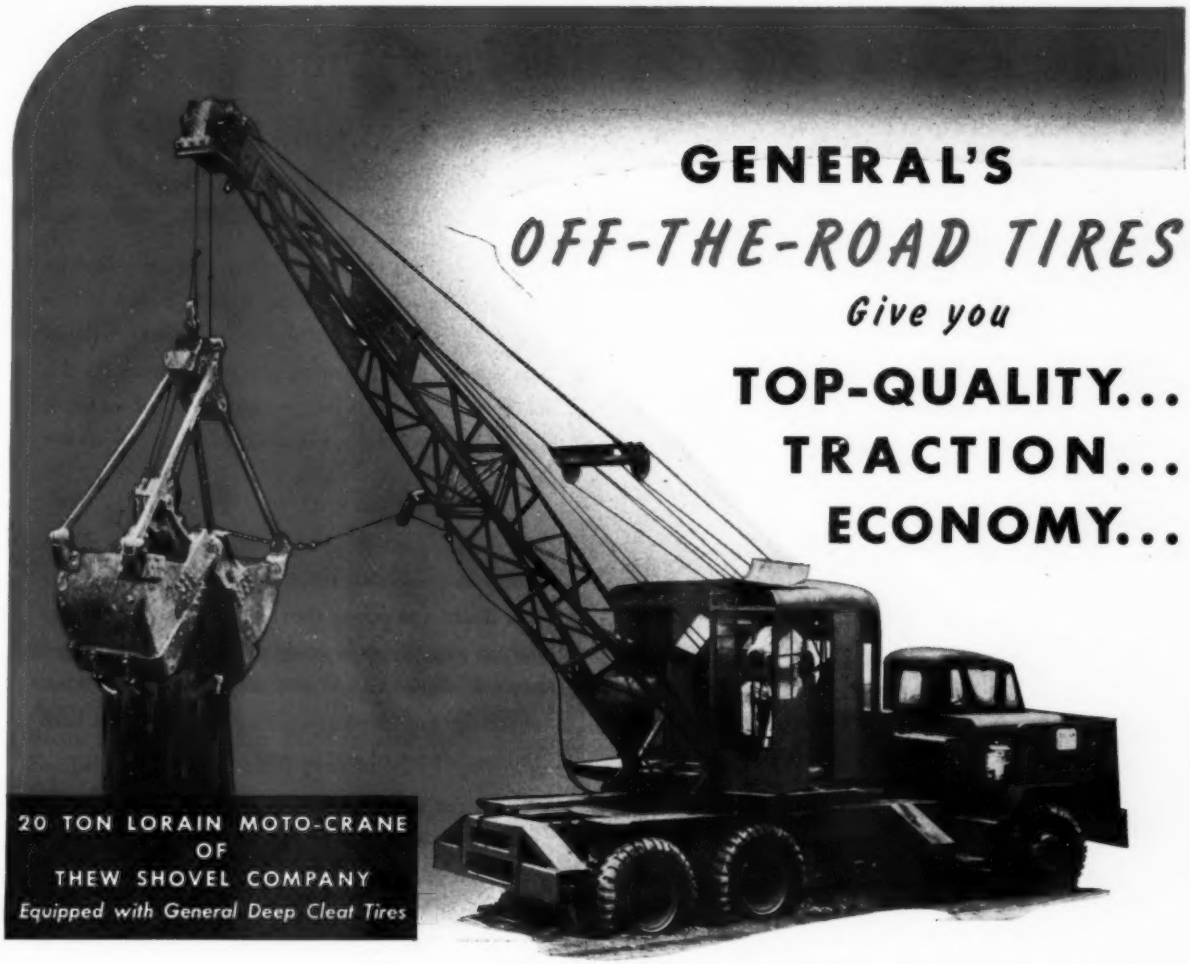

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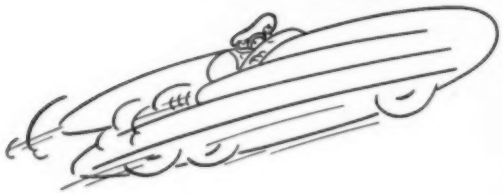

The genial old "General" is always the first to acquire these "postwar wonders" . . . a word to the artist and there's the old boy, sitting behind the wheel of an Atomic Eight! Not so easy for the rest of us . . . we'll wait a long time before we'll be able to wheel an atom-powered job down the highway!

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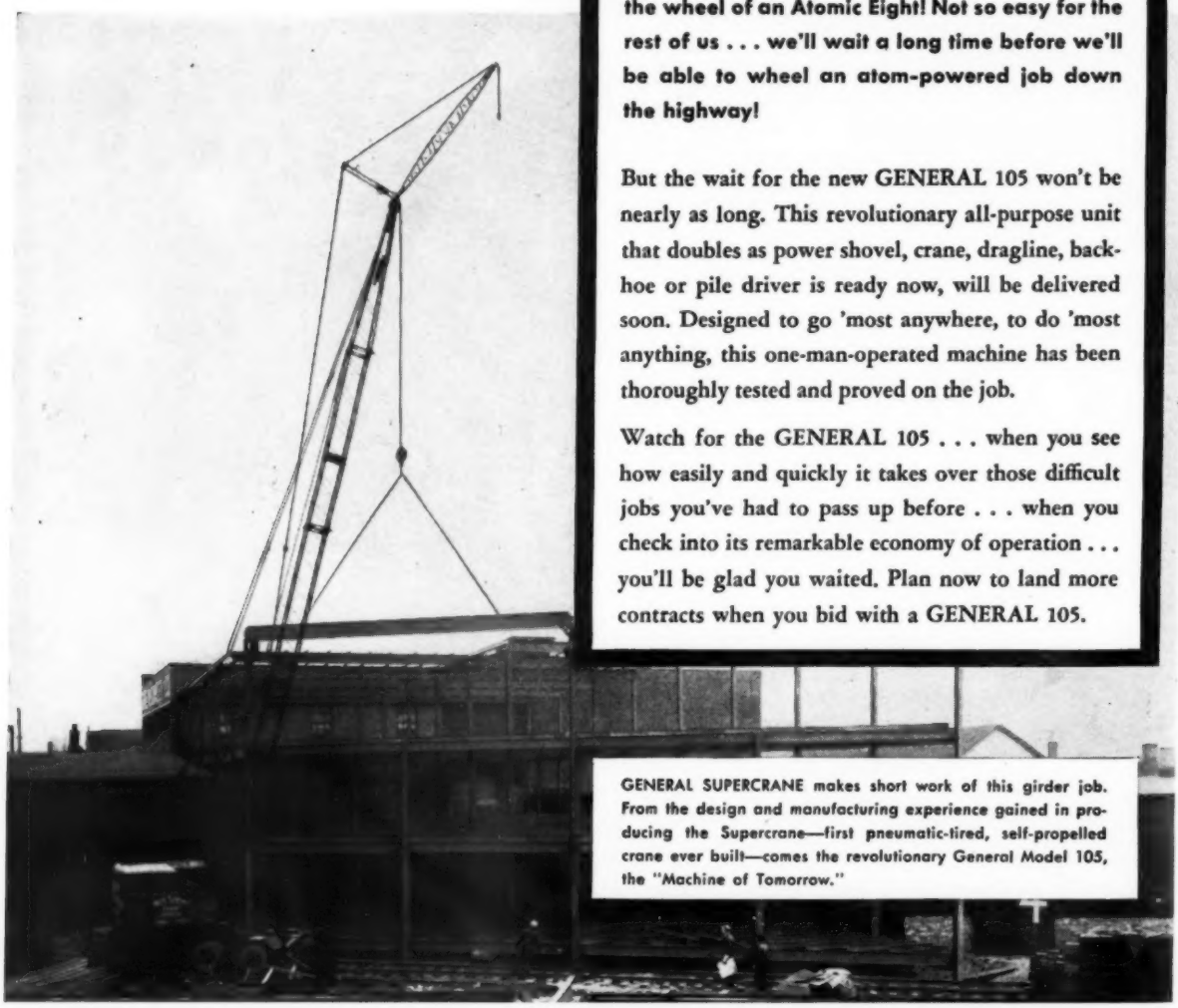

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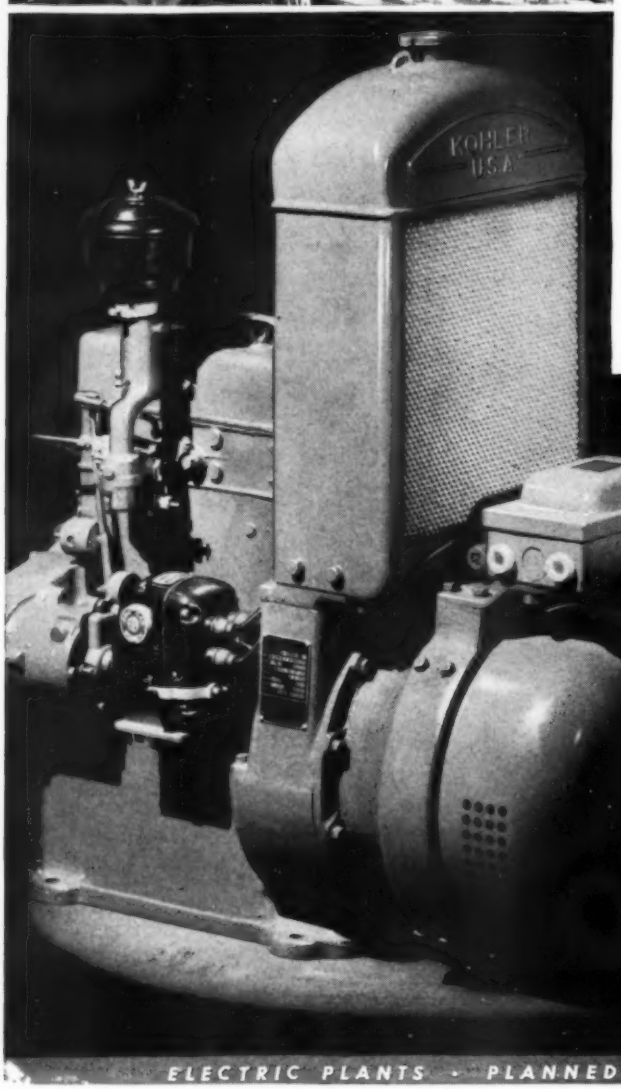

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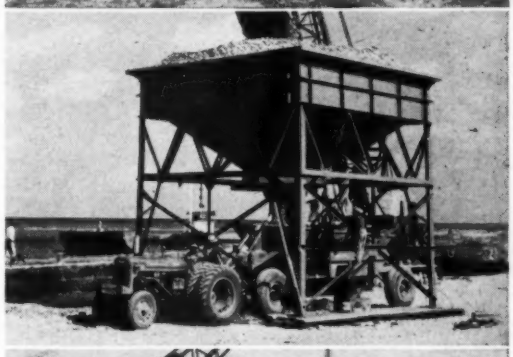

The pictures above show Mississippi Wagons being loaded with (1) dirt, on a drainage project in California, (2) phosphate rock, on a mining operation in Idaho, (3) oyster shell, on an airport construction job in Mississippi, (4) pit gravel, on a road-building job in Texas.

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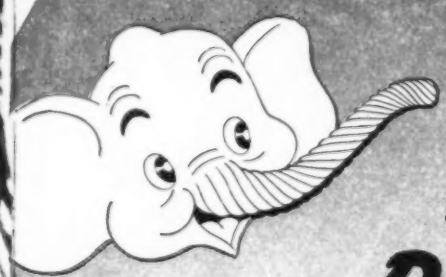

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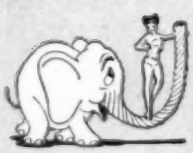
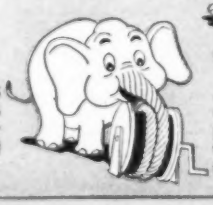
. . . does not spin over sheaves or grind through blocks.

UNION-FORMED SPOOLS BETTER
. . . even with a light load it winds evenly and tightly.



UNION-FORMED IS SAFER TO HANDLE
. . . worn, broken wires do not spring out and porcupine but continue to lie close to the rope.

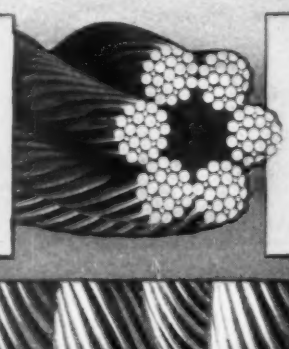


UNION-FORMED RESISTS KINKING
. . . because wires and strands are free of internal stress, they do not fight to get out of their preformed positions.

UNION-FORMED IS FLEXIBLE and RELAXED
. . . bends in any direction, yet has "toughness" to withstand jerking and other punishing strain.

UNION-FORMED HAS GREATER RESISTANCE TO BENDING FATIGUE
. . . withstands more bends, even reverse bends, because it is more stress-free internally.

union-formed (*Preformed*)



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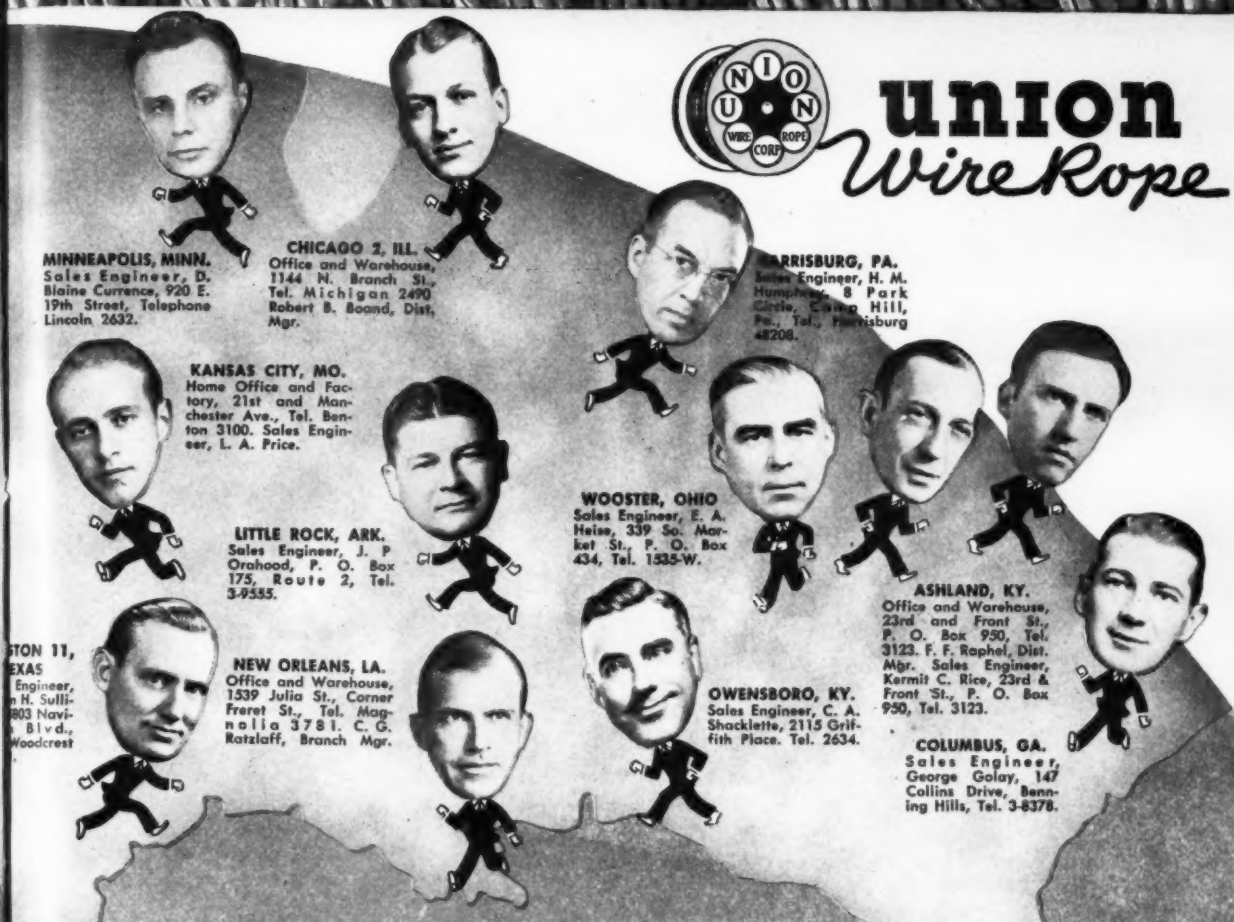
union Wire Rope



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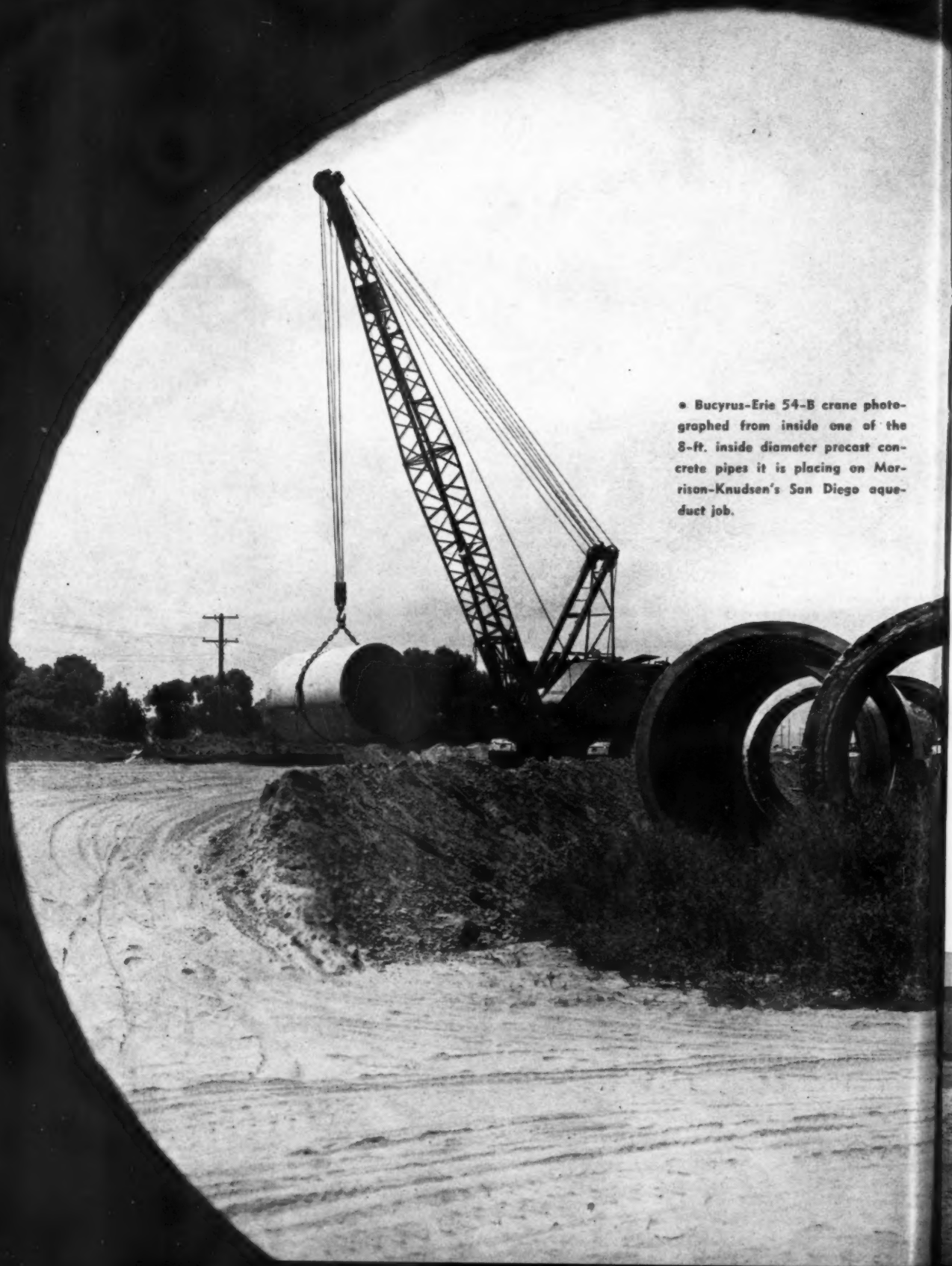
November, 1946



• Bucyrus-Erie 54-B crane photographed from inside one of the 8-ft. inside diameter precast concrete pipes it is placing on Morrison-Knudsen's San Diego aqueduct job.

San Diego Aqueduct

Guy F. Atkinson Company keeps equipment in operation 16 hours a day on $1,164,885 project to bring an additional water supply 72 miles to San Diego. Job includes construction of reservoir and 2.6 miles of 96-inch connecting pipe to Metropolitan line, and a concrete diversion structure.

By LAURAN G. CLAPP

ONE OF THE FIRST UNITS completed on the San Diego Colorado River Aqueduct was a 586-million gallon regulating reservoir located at the northern end of the 72-mile project. The reservoir, plus the 2.6 miles of concrete pipe connecting it with the Los Angeles Metropolitan Water District's line, and a concrete diversion structure to be located near the west portal of the Metropolitan District's San Jacinto tunnel are all part of a $1,164,885 contract being executed by the Guy F. Atkinson Company of San Francisco, California.

The Guy F. Atkinson Company is well-known for its work on Grand Coulee Dam, Washington, as well as the Los Angeles Hansen Dam, the Texas Denison Dam, and various large defense jobs in Southern California and throughout Alaska and the Aleutian Islands. The aqueduct project is under the supervision of the United States Navy, which is endeavoring to secure additional water for San Diego, since large military installations located there draw heavily on existing water supplies.

As a war measure, the 72-mile aqueduct was planned jointly by the Navy, the Bureau of Reclamation, and San Diego's own vote-created San Diego County Water Authority. Surveys were made by all three agencies. A route was selected that followed the Bureau of Reclamation's survey: several of the seven contracts had been awarded, and preparations were being made to get the work underway when the flood of war contract cancellations that followed V-J Day nearly stopped the project. Ranking Navy officials were prevailed upon to permit the work to continue, and by early fall the Guy F. Atkinson Company moved its equipment to the site of operations.

The San Diego Aqueduct regulating reservoir is located three miles west of San Jacinto, California, on slightly rolling ground not far from the dry bed of the San Jacinto River. The sandy loam of the area presented a problem in the construction of a basin that would hold water without seepage.

Clearing and Stripping

The 160-acre site was first cleared of a few scattered trees and fences and then stripped to a sufficient depth in order to remove existing grass roots and other unsuitable materials. The work was done with Carryalls and Super C Tournapulls and the material stockpiled outside and adjacent to the earth dike.

A compacted earthfill dike approximately 20 feet high was constructed around the area to form the reservior. One-third of the reservoir basin was high ground, which was leveled and used in the construction of the major part of the dike.

To make the embankment impervious, a section of clay material 10 feet wide was placed on the inside slope of the pervious section of the embankment. A trench was excavated at the base of the fill on the inside toe and backfilled with clay to prevent seepage under the dike.

The impervious covering for the embankment and inside of the toe trench was placed in a series of six-inch lifts, each of which, after being properly conditioned for moisture with a water truck, was compacted by 12 passes with a sheepsfoot roller.

After the embankment was completed the entire basin was blanketed with two six-inch layers of impervious material. Each layer was compacted with sheepsfoot rollers and flat-rolled to form a positive seal for the basin floor. To maintain the moisture in the clay blanket on the floor, a four-inch layer of sand was placed over the entire area. The sand blanket will be maintained in a moist condition until the reservoir is flooded.

In all, approximately 400,000 cu. yds. of impervious material was used to cover the inside of the embankment and to blanket the reservoir basin. This mate-

• General view of reservoir area after stripping and west dike embankment preparation, looking northeast. Lights mounted on poles permitted night operation.

• Above: This special grease truck is instrumental in keeping the equipment in operation 16 hours a day. Below: Impervious material from clay pit being loaded by dragline to 20 cu. yd. end dump truck.

rial was obtained from a clay pit two and one-half miles southeast of the project, and was reached over a private road constructed and maintained by the contractor. Loading was done with a 2½ cu. yd. Northwest shovel and hauling with 11-cu. yd. Euclid bottom dump trucks and 20 cu. yd. Western trucks.

The inside 3:1 and outside 2:1 slope of the dike was covered with a one-foot layer of grizzlied tunnel muck obtained from spoil piles at the portal of the San Jacinto tunnel. The maximum size for this material was five inches. The tunnel muck was loaded with the 2½ cu. yd. Northwest dragline with a 60-ft. boom onto a grizzly and caught directly into bottom dump Euclids. The two-mile haul from the spoil pile to the reservoir site was made on the pipeline right-of-way over a

• Below: Most of the 45,000 cu. yds. of riprap required for the inside slope of the reservoir banks came from this quarry 2¾ miles southeast of the reservoir site.

• Left: Northwest 2½ cu. yd. shovel loads to 11 cu. yd. bottom dump Euclid. Although in a sheltered spot a strong wind raised dust in this impervious fill borrow pit.

road constructed by the contractor.

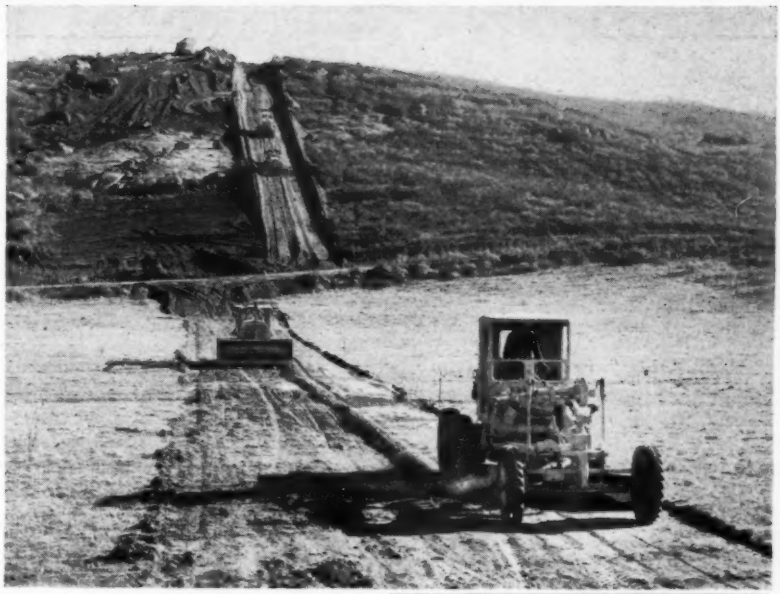
A portion of the riprap material required to cover the inside slope of the dike was the oversized tunnel muck obtained from the San Jacinto tunnel spoil piles, while the remainder was obtained from a quarry located 2¾ miles southeast of the reservoir. The 45,000 cu. yds. of riprap required was loaded with a 2½ cu. yd. Northwest shovel and hauled in 20 cu. yd. Western trucks. In completing the project an approximate total of 490,000 cu. yds. of material was moved an average distance of two miles and 450,000 cu. yds. an average distance of one-half mile.

The equipment required to perform the work in the allotted time was four shovels and draglines with 24 hauling units; six Super C Tournapulls; four scrapers; three water tank trucks; four sheepsfoot rollers; one flat roller; 16 RD8 tractors; four motor patrols with various maintenance and service units.

Water for compaction and sprinkling of the reservoir basin was obtained from a 540-ft. deep well put down on the project site by the contractor. This well was lined with a 12-inch casing and pumped with a high velocity electric pump.

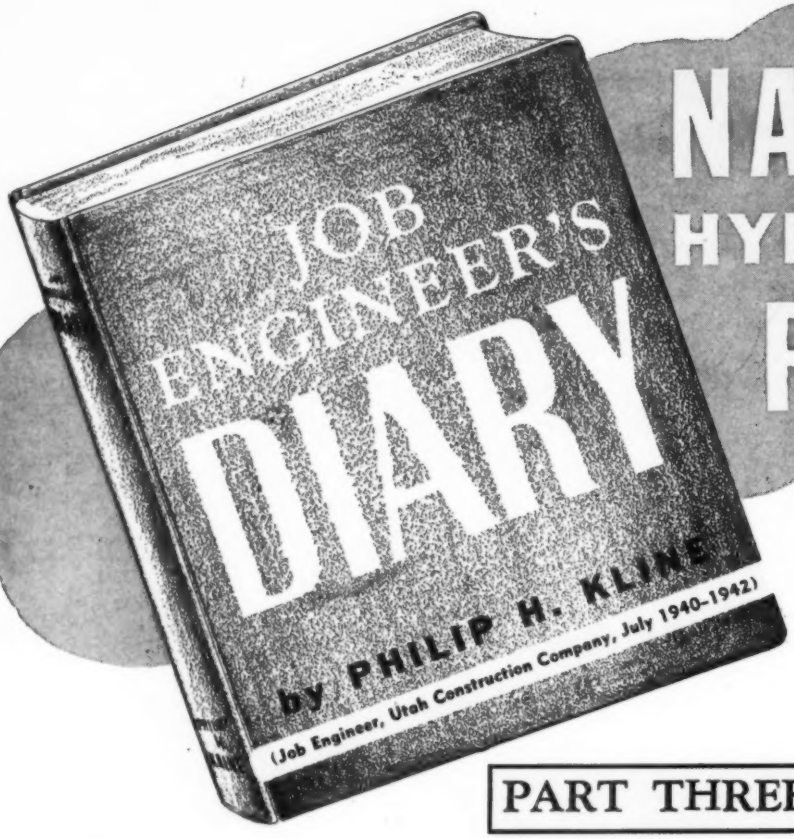
The equipment was kept in continuous operation 16 hours a day. Maintenance was provided by a special grease truck containing pressure greasing equipment, air, and water in addition to fuel

(Continued on page 652)



• Caterpillar No. 12 diesel motor grader works with three bulldozers grading a haul road so that pipe sections can be hauled to the aqueduct site.

• Air-powered tampers powered by Gardner-Denver compressor with Caterpillar diesel motor compact earth around pipe.



NANTAHALA HYDRO-ELECTRIC PROJECT

PART THREE

This is the final installment of the job engineer's diary reporting Utah Construction Company's weekly construction progress on the Nantahala Hydro-Electric Project. Nantahala Dam and appurtenant works was constructed in the uplands of North Carolina to increase power facilities for the Nantahala Power and Light Company, a subsidiary of the Aluminum Company of America. The author gives emphasis to excavation in his report of plant and equipment used, descriptions of setups and performances, job quantities and conditions involved, special features of the job, summaries of various records and history which are interspersed with the author's observation.

November 15 — Power tunnels have "holed through," with good alignment and grade connections. The first "occasion" was on September 23, between headings No. 1 and No. 2 and the traditional "party" was enjoyed by those who were about on that evening shift. Headings 3 and 4 followed on October 13 right on schedule. Clean-up and removal of facilities are under way.

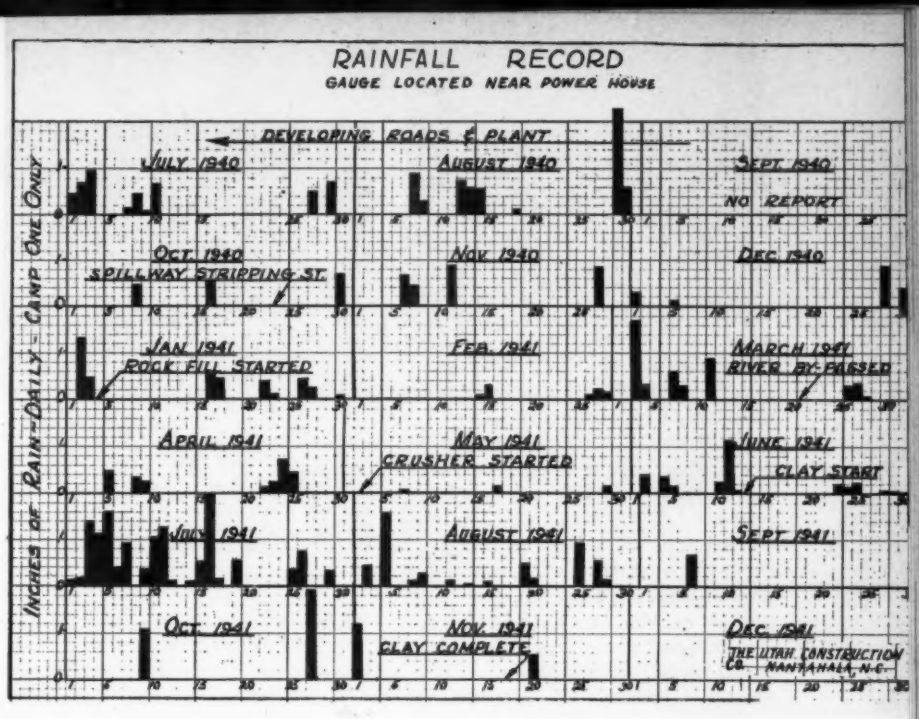
November 22 — The weather conditions prevailing were important to all current operations, as well as being valuable in judging weekly or monthly performance records. A complete record to-date (see opposite page) shows that much general rainfall prevailed and that there were occasional violent storms. One cloudburst at the dam site recorded 1.69 inches in less than an hour. Among other effects, high water scoured bridge approaches, required constant attention to road surfaces and drainage, and on occasions interrupted traffic and communications.

November 30 — The 120-B shovel completed all present clean-up of the quarry floor and started working in the channel for the spillway. This will be a conventional "bench" cut, working from both ends, and with Euclids hauling to the dam. Extremely hard and tight rock is being encountered at this depth, and good loading judgment is needed to get to grade and to confine the broken rock to easily handled areas.

December 8—The force is decreasing rapidly now, with major operations well under control. It may be a good time to list some of the organization before they get away. Job Manager A. H. Ayers and Gen. Supt. Geo. R. Putnam started the job. Mr. Ben Arp came later and supervised main tunnel, quarry, dam and other operations. Mr. A. C. Dennis was tunnel superintendent, R. H. Helme was master mechanic, S. K. Fraser, chief electrician, and J. C. Carwin, chief accountant, and later office manager. I wish there were space to list many more of the fellows who contributed in so many ways to the progress and effectiveness of the organization.

• Spillway channel cut at about 10 feet down near gates, station 11 + 00.

• Tailrace highway bridge, looking downstream.



Job engineering under the writer consisted of plant layout, construction aides, costs, progress, and general assistance to the superintendents. Area and office engineers and helpers completed a crew of about 11.

December 15—Many jobs in the power house area now require attention to voluminous detail. There are two highway bridges, a standard gage railroad track, grade, and trestle now built, and substructure and equipment to install for the turbine generator and auxiliaries. A derrick was set up to handle much of the power house work, and that equipment combined with the faithful 30-B finished the excavation and assisted in much of the backfill. To assure proper location, reach, and operations sequence, a wooden model of the power house framing was constructed to scale.

December 22—Credit should be given to the mill supply house services which were such an important feature in making the job click. Quick deliveries are important, but real satisfaction is found when the supplier who knows job conditions can talk the language of the construction operators and can save storage and inventories. Spare parts stocks are an example of the cooperation that can be achieved on a reasonable basis, to the mutual advantage of the local supplier and the large or small constructor.

December 31—Oh we have fun too! The Super led the parade when it came to staging a Christmas celebration in the form of a "Frontier Days" party. The local sheriff was rigged up with a bologna nightstick and one of the office boys made a most ravishing "Flora Belle of the Sawdust Bar." The owner's representatives, inspectors, truck drivers, wives, sweethearts, 'n all were on deck for the glorious open house.

January 8, 1942—Some general statistics on the tunnel driving:

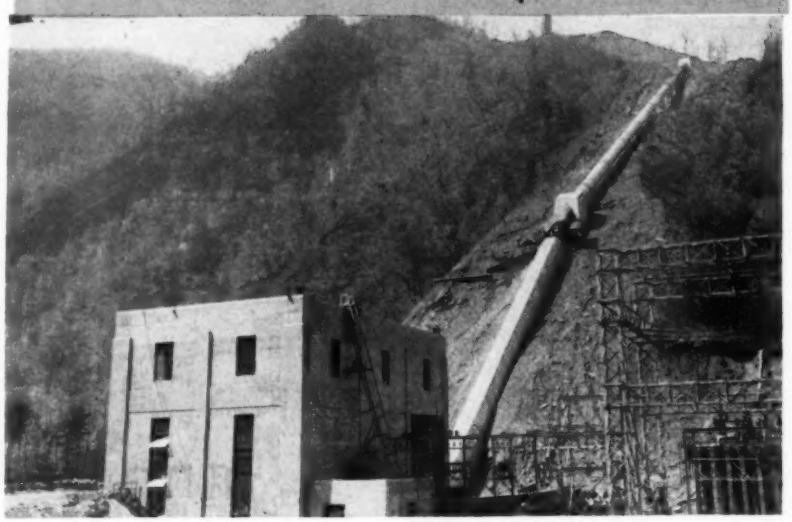
• Right: Complete drill carriage and steel car. Working platform folds down for ingress and egress. Note "bull hose" in foreground from 100 lb. compressed air line to manifold on drill carriage (part of the pipe-frame car structure). Below: "Super" and group of guests at a "Frontier Days" party.

Drillers, tenders, train and track crews, electricians, mechanics, shop men and supervisors comprised about a 30-man crew at each heading. Thirty-eight to 40 holes were driven with column or jumbo mounted drifter drills, using 12-ft. to 2½-ft., 1¼-inch round drill steel, with 1½-inch to 3-inch forged bits. Gilman automatic tempering machines were used in the sharpening shop. A total of about 400 lbs. of explosive per round was used, breaking eight feet advance per shot, or better.

January 15 — Operations were kept on a strict repetitive cycle with special operators for each phase of the work. At Dick's Creek, the two portals were separated by only a few hundred feet, and it was possible to alternate crews from one heading to another. While one face was being mucked, the opposite heading was being drilled. The tunnel superintendent kept track of time consumed on each operation, in both headings No. 2 and No. 3, and studied the blasting, ventilating, and set-up time.

January 22—Delays were carefully watched and corrected. A most consistent production footage was generally obtained. In a typical month, the highest daily (three 7½-hour shifts) advance was 30 feet, and the minimum was 25 feet. The average per shift was 8.9 feet that month. However, as crews became more proficient and as competition became more general, records were constantly being established. An advance as high as 50 feet a day was achieved in February, 1941, with no sacrifice to preceding or following production which ran 32 to 36 feet per day for the entire week.

January 31—Overall production averages for the entire 22,000 feet were of course affected by job conditions, shafts operations, timber installations, and coordination with related work, portals, pipe lines, diversion requirements, etc. Fourteen months were consumed from opening up to holing through. The best month for any heading was 899 feet of 13'x14' section tunnel. Clean up and removal of facilities proceeded at



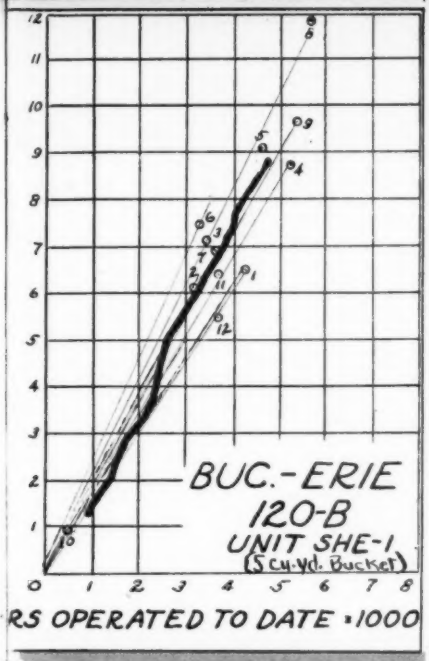
• Above: Piers for saddle supports of the pipe line were excavated and piles driven to give additional bearing. Below: The penstock pipe line has been installed and grading is essentially complete from the power house up to the surge tank riser.

better than 1000 feet per week, per heading.

February 8—The dam is now essentially complete. The diversion gates were closed January 30 and various bets are being placed as to when the water will reach certain heights. The roadway fill on the crest of the dam is being topped out by "Hoosier Dumping," backing up from the far abutment. Draglines are dressing the slopes and cleaning up around the spillway, casting over hillsides where possible. The spillway channel is taking shape with the same equipment performing grandly right up to the last dipperful.

February 15—At Dick's Creek, between Portals No. 2 and No. 3, piers for saddle supports of the pipe line have been excavated and piles driven to given additional bearing. The Bucyrus-Erie ⅜-cu. yd. shovel with crane attachment was used to backfill and assist generally on this work. The penstock pipe line has been installed, and grading is essentially complete from the power house up to the surge tank riser.

February 22—Careful costs and equipment records have been kept on major equipment and operations. Spot studies of many operations have kept supervisors advised of the results of the various methods of moving or preparing materials. Estimates of jobs to be done and alternate methods were prepared frequently by the engineering department. Accounting department costs have been carefully scrutinized and applied to production quantities. Hauling time and waiting periods were ob-



• Sample of charts prepared to show 1941 monthly production rates. Heavy line indicates performance accumulated to Dec. 31, 1941. Numbered dots indicate monthly production and hours at one-tenth of indicated scale. All quantities and hours are measurable operations only.

served and attention called to trip averages or truck requirements.

February 28 — A series of charts was prepared covering all 1941 monthly production rates. In the sample shown above for the Bucyrus-Erie 5-cu. yd. shovel we note almost 900,000 cu. yds. have been moved to December 31 in about 460 net operating hours or nearly 200 cu. yds. solid measurement per hour, **overall.** According to the numbered dots on the graph (which are read at one-tenth of indicated scale), we see that monthly production varied from a low in December (dot No. 12) to a steep rate in June (dot No. 6). The latter rate was 76,000 cu. yds. divided by 318 hours, or nearly 240 cu. yds. per hour.

March 8 — Tables have been compiled which show longer period averages. Over the eight-month operations from April to November, 1941, inclusive, the 2½-cu. yd. shovels moved about 50,000 cu. yds. of broken rock per month and the five-cu. yd. rig close to 80,000 yards, generally of larger size and more difficult loading (which saved secondary drilling). In one month 123,000 cu. yds. were handled by the 5-cu. yd. shovel. Scheduled hours were 50 to 80% of job time and delay hours from all causes were around 15% of scheduled time.

March 15—Must interrupt our statistical dope to talk about the weather. Rains, slides and haul roads repair, have been a constant harassment in all foregoing job problems. Constructors in the East will recall the record breaking unseasonal storm in March, 1942, when so much war work was in full swing. We had our share (18 inches). In addition there were heavy rains March 2 and 3, and more snow and rain the 9th. Just more delay in clean-up.

March 22 — Back to the "figgers." Trucks operated only slightly over 50% of job time, but delays were closer to ten per cent of scheduled time. On all service from October, 1941 to February, 1942, the Euclid 10-cu. yd. trucks averaged 28 cu. yds. per net operating hour on a haul of about 1000 ft., but with considerable grades and heavy loads. The Koehring 6-cu. yd. Dumptors, hauling about 1500 ft. on crushed rock mostly, and some grades, and congested fill space, were recorded at 14 cu. yds. per net operating hour. All four 12-cu. yd. scrapers averaged their 2000-ft. clay haul at 30 cu. yds. per net operating hour.

March 31—A record of heavy equipment "ownership" expense indicates current and future expense trends. Lighter shovels show more erratic repair trends but average out over long periods.

April 1—Summaries now made on crusher observations from week to week and on a sample shift basis indicate how it was possible to improve operations there and to maintain the needed balance of equipment used on clay-placing in the impervious fill blanket. This blanket, it will be recalled, was in between two crushed rock filter zones. Time studies indicated the type of material being fed, how it was handled and the functioning of auxiliary hoists, lighting, chutes, conveyor changes and other operating devices. In two instances it was found that the primary crusher was down over 16% of the time due to delays in delivery

• An 18-inch snowfall laid a beautiful blanket over the job but resulted in more delay in cleanup.

of the crusher feed from loading and hauling operations in the quarry.

April 15—Due to repairs and all other causes (some due to deliberate hold-ups because of bad weather), the plants only operated about 15 hours per 24-hour a day schedule. However, dam fill requirements were met by the combined units producing over 200 cu. yds. per net operating hour, over an eight-week period. A schedule of clay placement showed that during that same cal-

• Small rock-fill dams with clay cores, called "fuse plugs," were constructed at the ends of the gates to handle flood water.

endar time the crushers would have to produce 2450 cu. yds. per day. As will be noted this requirement was met and the stockpiles were increased which permitted more flexibility in other loading and hauling operations.

April 22—A special design device in the spillway was constructed at about this time. Across the channel cut, which was to be used to carry flood water so that it could not top the main rock fill dam, there were to be installed four Taintor gates. In case these gates, when open, would not carry the full flood, small rock-fill dams, with clay cores, were constructed at the ends of the gates. Dragline and bulldozer equipment placed these tamped "fuse plugs." With the completion of this work, all equipment was moved downstream of the dam and gates, ready for final clean-up and shipment or storage.

April 30 — By this time final payment estimates are getting into shape. Much poring over cross-sections, field notes, progress records, and job inventories. Day and night sessions with owner's engineers generally reconcile large differences and get down to cases and facts of past history. The documentary record, tabular, graphic and by photos, is now proving of real dollars and cents value.

May 8 — Job summaries are made for the company's estimating and final negotiation files. The complete original job schedule has been revised by inserting actual dates of construction. This gives a complete picture of the 59 original bid items and the 23 added unit price items. Quantities of each item are shown. Unit cost summaries and details are prepared as needed.

May 15—An important feature of this work, as well as expediting the final clean-up of the job was the careful administration and follow-up of "extra work" items. Timekeepers, field engineers, foremen and material dispensers were ever alert to note the work being done on the many scattered locations. Questions as to contract item coverage were referred to the job engineer and, if not clear, to the superintendent.

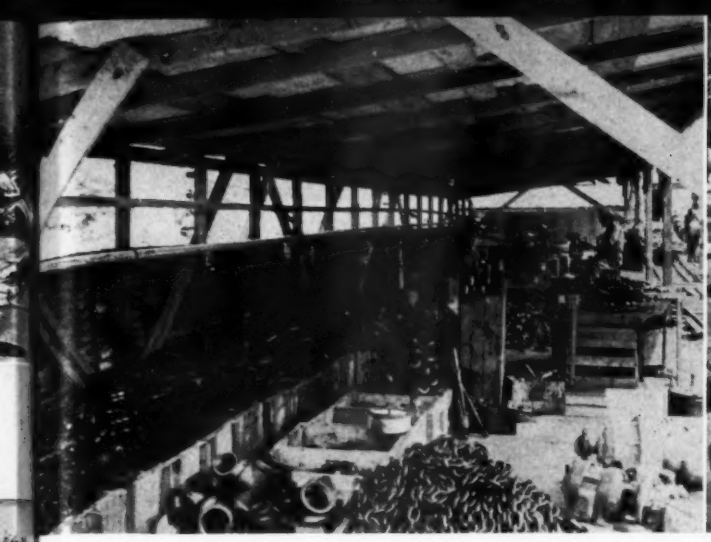
May 22—Forms were prepared

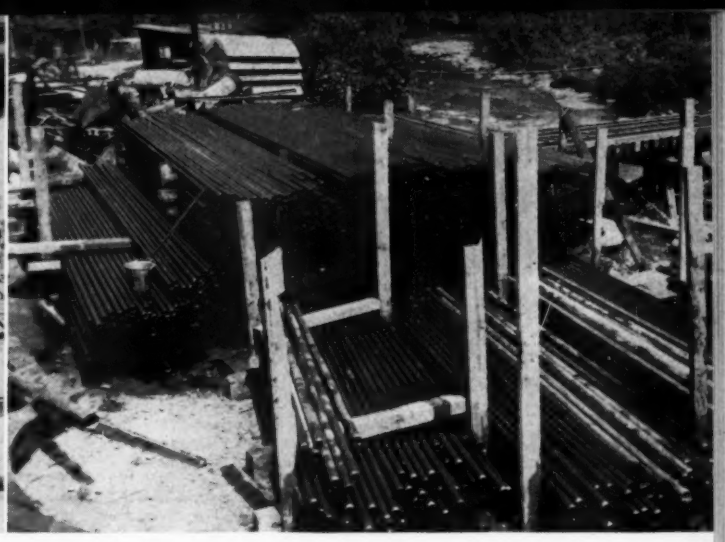
• **Left: Spillway controls works. Counterweights on gates Nos. 4 and 3, welding on gate No. 2. "Fuse plugs" to right covered by small slide of rock. Below, left: Dick's Creek Portal No. 3. Flushing tunnel from intake gate — approximately 100 cfs. Note removable section to left. Below, right: Penstock anchor — 9 + 70. Flushing tunnel from intake gate, approximately 60 cfs.**

• **Above: General view of equipment yard and repair platforms and shed. Below: Repaired and painted buckets with coiled operating lines ready for shipment.**

that gave advance notice of work authorized for which "force account" agreements would be used. A case history of those operations showed the place, dates of starting and stopping, authorization, quantities, equipment, material and labor used, etc. Equipment rental rates were set for such work. On such a factual basis it was found that agreement as to payment was greatly expedited and with clearer understanding and less loss of time by job officials.

May 31 — Switchyard grading was done by the Bucyrus-Erie ⅜ and 1-cu. yd. shovels. Shops and camps were dismantled by crawler cranes, aggregate bins were cleaned up, slope dressing on all completed work was done by draglines and bulldozers. More rains





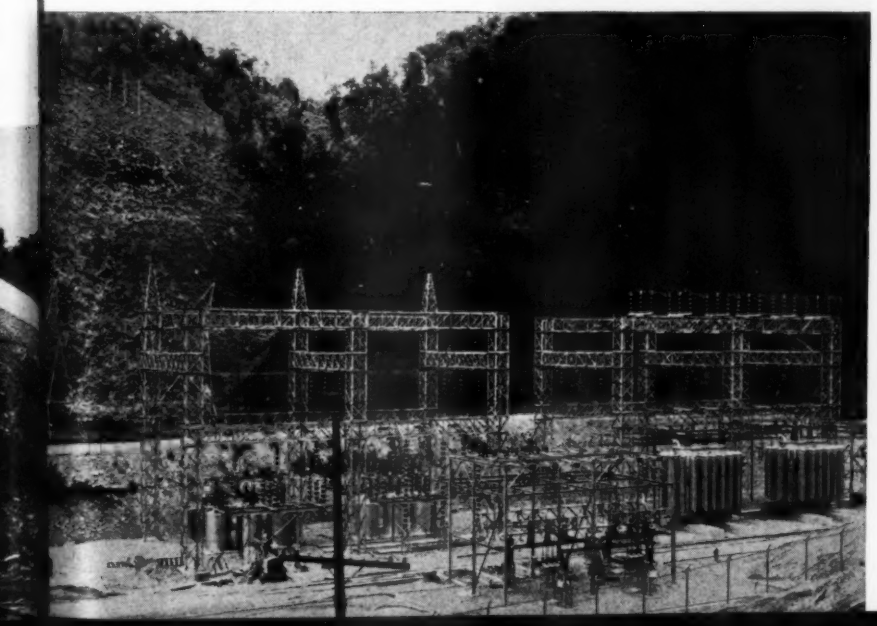
• Left: Material salvage. Pipe fittings and miscellaneous hardware sorted at lower end of asphalt paint shed. Right: Reclaimed pipe stacked near railroad in convenient load-out tiers. Outside of pipe is brush-coated with oil.

and slides necessitated some rehandling and finishing on completed work. The tunnel was flushed to remove loose rock and sediment. Spillway gates installation and clean-up of final trim continued.

June 8—We are now well down on the "Punch List" of items to wind up the job. Weekly blueprints were circulated to all top supervisors and to owner's representatives showing the location, type of work, scheduled sequence and present status, hold-ups or prospective attention for each item. From over 100 items originally listed, there only remain 10 or 15 which are being given priority according to operating needs.

June 15 — Equipment clean-up and overhauling is progressing nicely. A high pressure steam cleaning jenny and full shop and yard facilities are putting this work under efficient control and production. Adequate working platforms, handling devices, and orderly storage advance this operation rapidly with minimum overhead and mechanics' time.

June 22—An important part of this work was the salvage and reconditioning of used pipe. Varied assortments of pipe and fittings were sorted by material and size and put through cleaning baths, straightening devices and final painting and preservation treatment. A crew of about six men, mostly laborers, performed this work by an assembly line technique.



• Nantahala Power & Light Co., switchyard (154-KV structure in background, 22-KV structure in foreground).

June 30 — Equipment is now loaded out to many new jobs, some being driven through. Careful blocking and car inspection is given. Dunnage is provided from salvage of buildings and structures and scrap material.

July 8 — The generator is "on the line" and operation tests are complete. Manufacturers' representatives are leaving. It is anticipated that all force account work will be wound up next week.

THE END

Author's Note: While emphasis in this article has been placed on the excavating procedure, equipment, performance and related problems, which were dominant in the preparation of all works, it should be remembered that those operations were often coincident with the erection of structures and installation of operating machinery.

• Philip H. Kline

A major building job was involved in the construction of the all-concrete power house. Other permanent buildings including gate control houses, pipe lines, penstocks, surge tank erection, and machinery installation had to be coordinated with other operations. Concreting plants utilized much hauling and crane equipment in at least 15 varied locations. Gate frame guides, and sliding, Taintor, and roller gates required attention of heavy hauling and rigging jobs.

Job administration handled all contractual and labor relations.

Soil Auger

Exploration Speeds Work on Friant-Kern Canal

BY J. J. WADDELL AND JOHN W. FRINK*

• Left: Setting up drill preparatory to starting a new hole.

ECONOMICAL and speedy subsoil exploration, cutting cost 85% and time 96% below standard methods, is being achieved by the U. S. Bureau of Reclamation along the course of the Friant-Kern canal in California. A 22-inch earth auger mounted on an Army 4 x 4 and a "good all-round" jeep, carrying personnel and equipment, anchoring a geologist's rope-ladder, or dragging a miniature Fresno, do the job.

The Friant-Kern canal, an important part of the Bureau's Central Valley Project, takes off from Friant Dam to carry most of the San Joaquin river 160 miles south to dry Kern county. The normal exploration and construction schedule of the big ditch — designed for an initial capacity of 5000 cfs—was interrupted by the

*J. J. Waddell is Engineer and John W. Frink is Geologist of the U. S. Department of Interior, Bureau of Reclamation.

• Left: Sampling earth from a 22-inch bit. Samples taken from various levels were saved for laboratory testing.

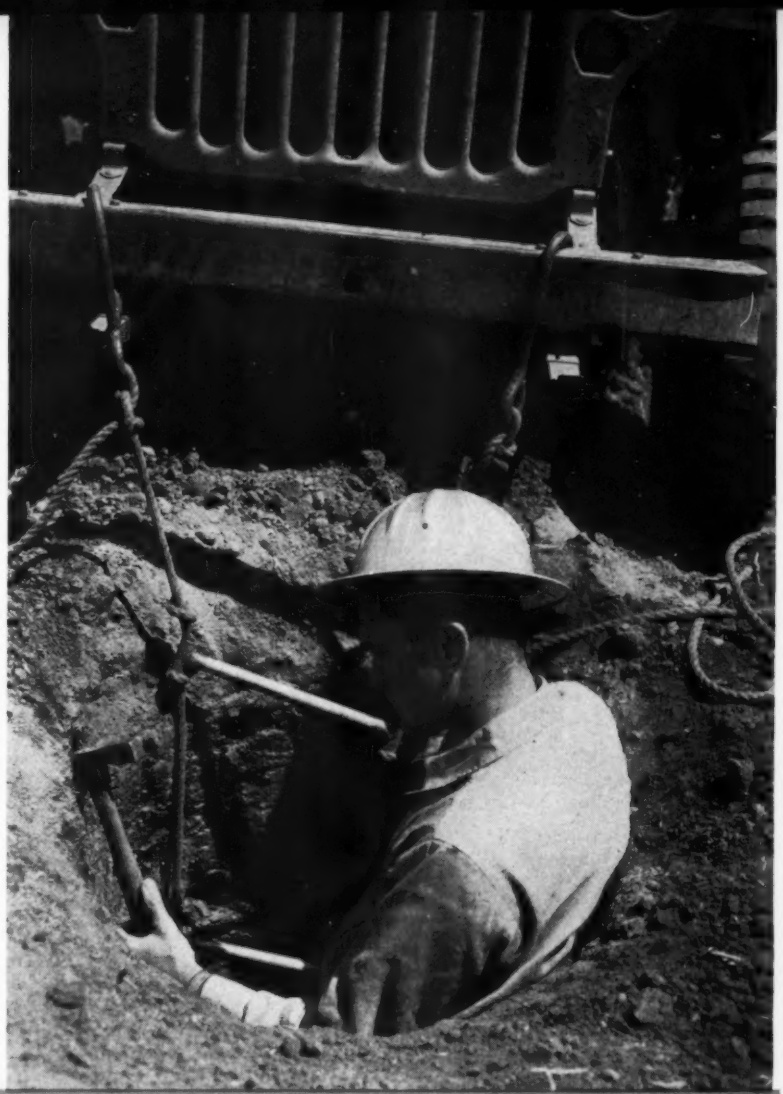
war in 1942. Expanded farming operations since that time make the need for the canal's water immensely urgent and have dictated a sharp construction speedup.

One of the bottlenecks this accelerated construction program faced was exploration of soil structure. A large portion of the canal between the Kings and Kaweah rivers, south of the San Joaquin, was originally planned to be unlined. But preliminary investigations indicated that percolation in some areas might be excessive, making lining necessary. In order to locate these areas accurately, a program of test-pit exploration, necessarily extensive, but with a severe time-limit, was begun. The program consisted of digging a large number of exploration holes to the bottom grade of the canal, usually 10-15 feet below the ground surface, to check earth materials, their condition, probable permeability and suitability for compacted earth lining.

Exploration started with five two-man crews digging 4′ x 5′ pits with hand tools, occasionally aided by a portable compressor and jackhammer. A two-man crew could excavate about six inches an hour.

To speed up the work, a gasoline-engine-powered auger,

(Continued on page 653)



• Above: Geologist, going down a rope ladder attached to a jeep bumper, logs the hole in much the same manner large diameter core holes are logged. Below: Small Fresno scraper, pulled by the jeep, is used to backfill the exploratory holes.

• Below: Earth drill with tower lowered to travelling position.

Compare these SHORT HAUL *TOURNAPULL* job records with your crawler output

Authentic job data proves Tournapull speed will move more dirt for you . . . at ANY range

On short hauls like these, Tournapulls give you increased production because: (1) rubber-tired 2-wheel traction gives you faster maneuverability . . . (2) high ratio of horsepower to deadweight gives quick acceleration to high gear . . . (3) Tournapull speed, 2 to 3 times faster than the fastest crawling tractors, saves time on short as well as long hauls . . . (4) fewer moving parts mean less wear, less down time, more work time. You'll find that Tournapull ability to move dirt at the lowest-net-cost-per yard on both short and long hauls will increase your profits on any type of dirtmoving for highways, airports, dams, levees, railroads, landleveling, stripping, etc. Tournapulls are your safest insurance for future earnings. Your LeTourneau Distributor has complete facts. Ask him to show you.

300' one-way haul

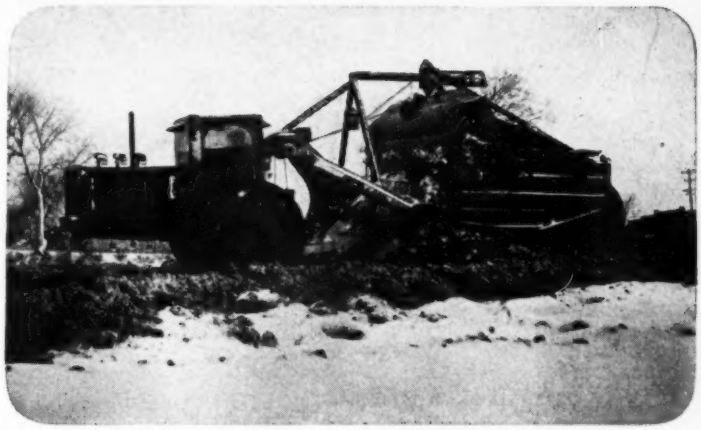
On grading for building site in Fort Wayne, Indiana, J. C. O'Connor & Sons, Inc., used 4 Tournapulls. Stripping dry sod, rigs got heaped loads in 0.6 minutes, delivered 21 loads each per 50-minute hour . . . kept up this high-speed production 9 hours per day. Tournapulls drove 230 miles to the job from Bloomington, Illinois, in 20 hours.

300 to 600' one-way haul

"Our Tournapulls moved more yardage on hauls as short as 300' than any other piece of dirtmoving equipment on the job", says Sal Augustine of Augustine Construction Co. Job: 250,000 yd. Queens Lane Reservoir in Philadelphia. Time study showed each Tournapull averaged 1500 pay yards per 8-hour day on 600' one-way haul - - double production of crawler-drawn scrapers working on same cycle.

525' one-way haul

Working in soggy clay, wet from several weeks of rain, 2 Tournapulls made round trips every 4½ minutes on 525' one-way haul. These rigs completed cycles fast because big-tired traction and flotation kept them rolling through the wet, sticky fill . . . positive load ejection spread soggy clay fast. The job: Talbott and Myers Construction Co.'s 50,000-yard grading contract at Lexington, Kentucky.



550' one-way haul

12 trips per 50-minute hour — net hourly production 288 pay yards. That's the kind of yardage R. C. Micotto's 2 Tournapulls moved for him in heavy yellow clay on 125,000 yard landleveling project for a real estate subdivision near St. Louis. This entire job was a short haul operation . . . almost all dirt hauled under 800'. Production like this is proving that Tournapulls can economically handle short haul dirt.

450' one-way haul

"Two Tournapulls maintain average production of 2000 pay yards per 10-hour day", says Superintendent Lassiter, on 50,000 yard stripping contract for chalk mine at Macon, Georgia. Working in hard, damp fullers earth and red clay, each Tournapull delivered 1/3 more yardage than similar-capacity, tractor-drawn scraper working on same 900' cycle. Contractor A. L. Riley's Tournapull operation proved so successful that he was given a new stripping contract for additional 60,000 yards.

LETOURNEAU

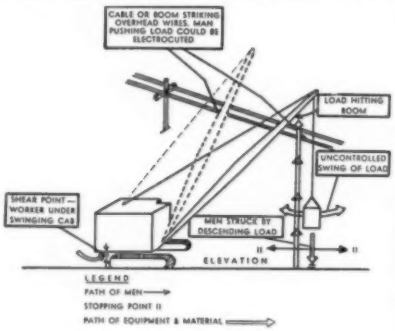
PEORIA, ILLINOIS ♦ STOCKTON, CALIFORNIA

JOB-PROVED Over 4600 Built and Shipped

TOURNAPULL

Field NOTES

Electric Shock—Power Lines


CABLE OR BOOM STRIKING OVERHEAD WIRES. MAN PUSHING LOAD COULD BE ELECTROCUTED
LOAD HITTING BOOM
UNCONTROLLED SWING OF LOAD
SHEAR POINT — WORKER UNDER SWINGING CAB
MEN STRUCK BY DESCENDING LOAD
ELEVATION
LEGEND
PATH OF MEN
STOPPING POINT
PATH OF EQUIPMENT & MATERIAL

Crane operations close to power lines deserve particular attention. The electrocution hazard caused by the crane boom or fall cables touching power lines is one of the most serious in the construction industry. A closed electric circuit and a difference in voltage are required for the passage of current. A worker can become part of such a circuit by contact with a ground and a live wire or electrically charged part.

As the fall line cable or boom accidentally touches the power line, the crane, boom, cable and attached bucket become electrically charged. Thus the crane operator has a heavy responsibility to prevent the boom or fall line cable from touching power lines. This responsibility becomes all the more important when it is realized that the crane operator is in a relatively safe position while in the cab, due to the low difference in voltage across his body. A worker on the ground touching any part of the crane when it is charged becomes part of a closed electric circuit with a high voltage drop and is electrocuted. If the operator should step off the crane when it is charged and have one foot on the ground and the other on the crane, he too would be electrocuted.

Where work requires crane operations close to power lines, foremen and crane operators should check with the "Boss" on:

1. Relocation of the power lines or
2. De-energizing of the lines or
3. Erection of mechanical barriers over the crane boom, cables and wires to prevent physical contact with the power lines.

Courtesy of Liberty Mutual Insurance Co.

Crankcase Oil Changes

Special precautions are necessary when changing from straight mineral oils to detergent type oils. These oils, when introduced into a dirty engine, may loosen sludge deposits and drop them into the crankcase where they may clog oil pump screens and oil lines. The following procedure is recommended when changing over to detergent type oils:

1. In new or newly overhauled engines which have been thoroughly cleaned, oil should be changed after the first 500 miles or 25 hours of operation. A second change should be made after an additional 500 to 750 miles or 25 to 35 hours. A third change should be made after 1,000 miles or 50 hours, after which the regular oil change interval may be followed. Change oil filter cartridges and clean filter sumps at each oil change.
2. When detergent oils are to be used in other than new or newly overhauled engines, the following procedure is recommended:
   a. Remove crankcase oil pan and clean.
   b. Remove valve covers and clean valve compartment.
   c. Thoroughly clean oil filter sumps and install new filter cartridges.
   d. Remove oil cooler and clean.
   e. Re-assemble engine, install detergent oil. Change oil before 250 miles or 10 to 15 hours. Change oil again at 500 or 750 miles or the corresponding number of hours.
   f. Proceed to operate engine on regular oil change interval.
3. When it is not practical due to lack of man power or other reasons, to clean engines in the above manner, the first filling of detergent oil should be used for not more than 50 miles or 5 hours before draining. Subsequent changes should be made at intervals of 250 miles or 10 to 15 hours and at 500 miles or the corresponding number of hours before going to the regular oil drain schedule.

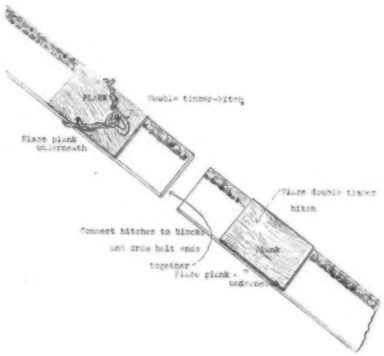
Drain crankcase oil immediately after stopping the engine, not 10 or 15 minutes later. Draining while the oil is hot removes more of the contaminants from the crank case.

Oil pressure gauges should be watched carefully during the change-over period. If the pressure drops, engine should be stopped immediately to avoid possible damage from plugged oil screens or lines.

Courtesy of "The Gulf Contractor"

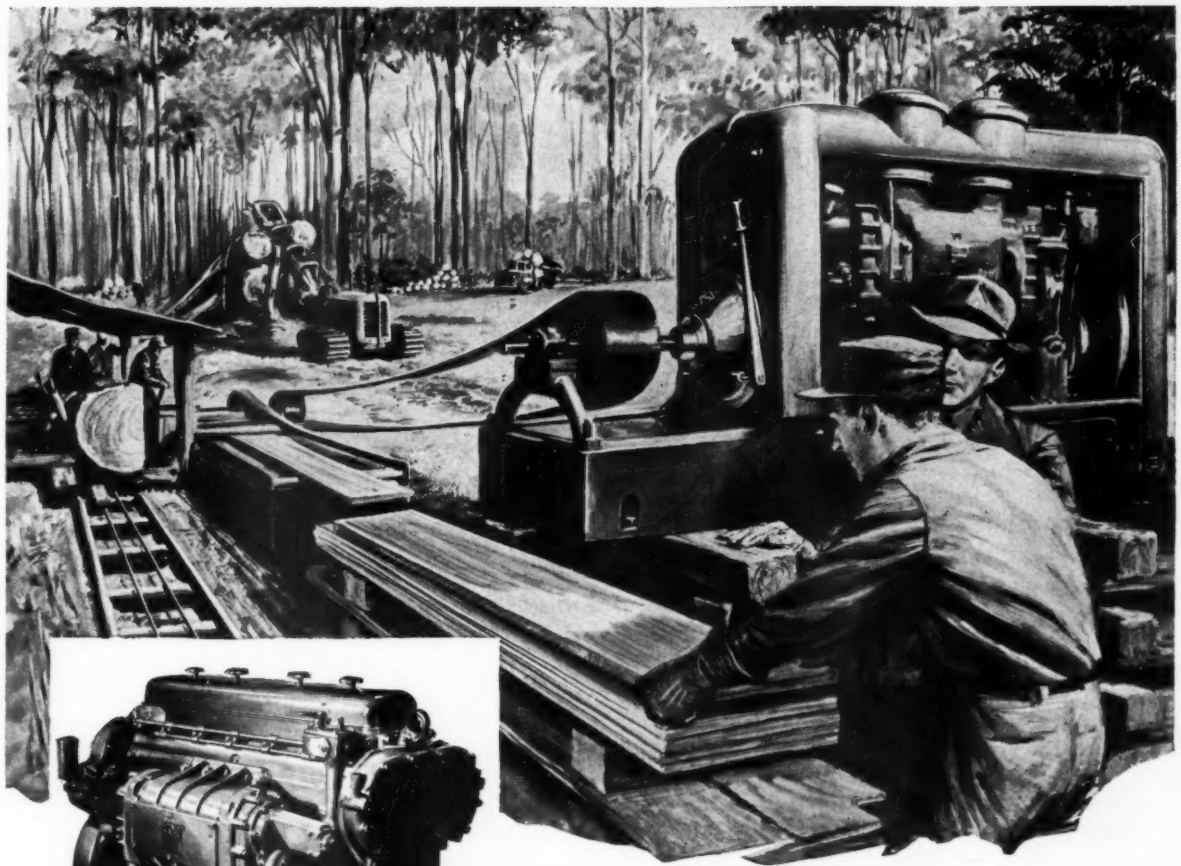
The Lacing of Large Belts

There is a speedy trick for lacing large belt ends together when equipment is too small for drawing the belt ends together. Obtain four pieces of plank the same width as that of the belt to be laced. Then sandwich each end of the belt between two pieces of plank and fasten in place with a double timber hitch. Be sure to leave enough space between the wood blocks and belt ends to allow easy lacing when the ends are pulled together.



After the timber hitches are put in, hook a rope or chain block to the hitches and pull the ends together. The belt is now ready for lacing. This method will protect the belt as it is placed on the pulleys without stretching one side, and thereby damaging the edge of the belt as is often the case when a belt is first laced and then "rolled" on over the edge of the pulley.

W. P. HOUSER.



CONTRACTORS—

For Great Diesel Power

take a look at Lumbering

THROUGHOUT the lumber industry a new kind of power is taking over. It is flexible power that can operate the whole mill—can drive pond drag, head saw, edger, trimmer, cut-off saw, conveyor and what-have-you. It is economical power—makes fuel costs next to negligible. It is sturdy power—responds immediately to increased loads. It is portable power—moveable to the next job with little fuss.

In short it is Series 71 General Motors Diesel power.

GM Diesels are 2-cycle. That makes them compact as well as powerful. They have clean design, unit injectors and Uniflow scavenging—making them clean-burning, efficient and easy to take care of.

These features make GM Diesels important to any industry.

* * *

So whatever needs for power you may have in road-making machinery, crushers, shovels or any other construction equipment—look to GM Diesels.

DETROIT DIESEL ENGINE DIVISION
DETROIT 23, MICH. • { SINGLE ENGINES . . Up to 200 H.P. / MULTIPLE UNITS . . Up to 800 H.P.
GENERAL MOTORS

GM
GENERAL MOTORS
DIESEL POWER

Features of GM Diesels Important to Every User of Power

- *QUICK TO START* on their own fuel
- *ECONOMICAL*—run on low cost fuel
- *EASY TO MAINTAIN*—clean design plus accessibility
- *LESS FIRE HAZARD*—no volatile explosive fuel
- *COMPACT*—readily adaptable to any installation
- *SMOOTH OPERATION*—rotating and reciprocating forces completely balanced
- *QUICK ACCELERATION*—2-cycle principle produces power with every downward piston stroke

Equipment you ought to KNOW ABOUT

For further details about the equipment on these pages please write to the manufacturer, mentioning Excavating Engineer.

Double Unit Welder

Manufacturer: The Hobart Brothers Co., Troy, Ohio

Claims: A two-operator gasoline engine driven arc welder that was developed by placing two 300 ampere generators on a common shaft and connecting the unit to an 8 Cylinder Chrysler Industrial Engine. Two operators can work independently of each other, since the engine is governed to maintain constant speed for all loads. A paralleling switch is also provided to turn the unit effectively into a single operator 600 ampere unit for heavy welding and cutting duty. This paralleling unit effectively doubles the welding range of the conventional single operator unit and is of great value on construction and maintenance work where a great variety of welding is experienced.

Front End Loader

Manufacturer: American Tractor Equipment Corp., Oakland, Calif.

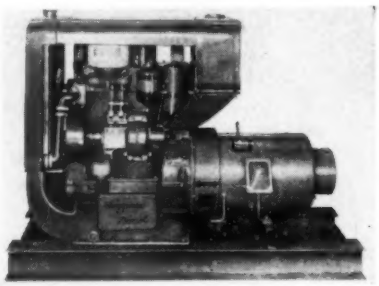
Claims: This new loader, the ATECO Model L-HG, is a small tractor loader with a ⅜ or ½-yd. bucket and high dumping clearance of 96″ and is built for mounting on the Cletrac HG 42 Track-Type tractor. The L-HG has an overall height of 90″ in digging position and 60″ when bucket is in carrying position. Able to be raised to clear 108″ before dumping, the bucket has a clearance of 96″ after being dumped.

The loader will pick up, carry and load almost any bulk material from sand and gravel to cinders and shavings and the entire unit, including loader, hydraulic pump and tractor, weighs but 5250 lbs. which enables it to work safely on concrete floors. The bucket can be interchanged with bulldozer bowl attachment.

Diesel Generator

Manufacturer: R. H. Sheppard Co., Hanover, Pa.

Claims: The Sheppard Diesel A. C. generating set now features

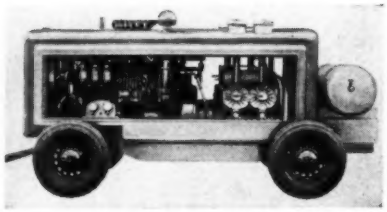


the recently developed Regulectric Generator which insures constant, steady power without the use of accessory regulating equipment. Utilizing a built-in circuit, the Regulectric is compact and without moving parts. Factory set, it requires no attention while in operation and is extremely sensitive to small changes in generator voltage, maintaining a normal variation of +2% from no load to full load. Action is instantaneous in restoring voltage on sudden load changes.

Davey Compressor

Manufacturer: Davey Compressor Co., Kent, Ohio.

Claims: Known as the 315-W (gas) and 315 WD (diesel), this first model in the 1947 Davey line produces 315 cu. ft. of free air per minute at 100 lbs. pressure. It is available in standard skid, steel wheel trailer, and pneumatic-tired trailer mounting styles, and flanged wheel types for railroad work. Representing a radically new departure in Davey design, the unit consists of two banks of three cylinders, each bank being arranged in W form. This construction, together with a short four-inch piston stroke, reduces compressor vibration to a minimum, according to Davey, and results in a cooler operating machine.

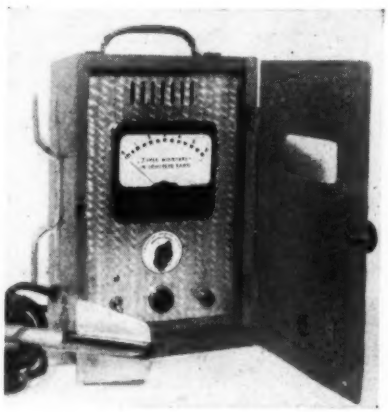


The W design also permits reductions in dimensions and weight. Gasoline driven units have an over-all length of 140 inches, while diesel machines are 12 inches longer. Height is 72 inches and width 65 inches for both gas and diesel machines. Gas units weigh 7,400 lbs. and the diesel weight is 7,800 lbs.

Moisture Meter

Manufacturer: J. Thos. Rhamstine, Harlingen, Texas.

Claims: A new type of meter for the determination of free-moisture in concrete sand designed to eliminate time consuming and cumbersome specific gravity testing methods. Embodying new principles and procedures, the instrument is electrically op-



erated and has a specially "prod" or pickup which is inserted in the sand to obtain a reading. It is a constant operating device and the "prod" can be mounted in the batching hopper to allow the meter needle to indicate the percent of free moisture continuously.

Installation is not involved, the user standardizes his meter for the particular sand he is using, and once set it requires no further calibration for that one specific quality or type of sand.

Truck Tire

Manufacturer: The Goodyear Tire & Rubber Co., Inc., Akron, Ohio.

Claims: The largest truck tire ever built in Goodyear's history, a 27.00-33 earthmover casing, is designed to handle unusually heavy off-the-road hauling re-

quirements. Weighing 1,482 lbs., the tire has a load rating of 27,600 lbs. at 40 lbs. inflation at 10 mph. At 25 mph. it has a load rating of 27,600 lbs. also at 40 lbs. inflation.

Made with heavy gauge 24-ply rayon, the overall weight of tire, tube and rubber flap will total 1,627 lbs. The tire is manufactured in two tread designs — All-Weather and Sure Grip — and will fit a five-degree taper rim with sufficient compression under the bead to prevent slippage at low pressure.

Pot for Pouring Solids

Manufacturer: Aeriol Products Company, West New York, N. J.

Claims: Containing a big shovel onening for easy filling, this new pot may be used for spreading chips, sand, gravel, slag, salt, calcium chloride, and cinders. Made of light all-welded construction, accumulations of cold asphaltic material may be burned out of the pot as no solder, lock-seaming or galvanizing are used. The pot provides a more even spread than shoveling and gives a neater and more economical job.

Power-Package

Manufacturer: Salsbury Motors, Inc., Pomona, Calif.

Claims: Consisting of a 6 h.p. gasoline engine, with automatic clutch, and automatic transmission, the Power-Package is designed to transmit power gradually and at varying speeds in any of the uses to which it may be installed. Capable of powering light vehicles, the package may also be used in small scrapers, graders, cement mixers, small hoists, winches, etc.

Weighing 56 lbs., the engine can develop 6-½ h.p. at 3200 r.p.m. The engine, clutch, or transmission may also be purchased separately.

Motor Graders

Manufacturer: J. D. Adams Manufacturing Co., Indianapolis, Ind.

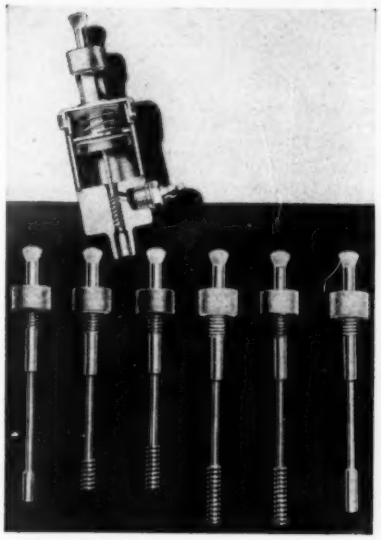
Claims: Products of more than five year's research, these three models of motor graders feature a distinctive high arch front axle. The models are: the No. 512 (extra-heavy duty), the No. 414 (heavy duty), and the No. 312 (medium duty). It is claimed that the high arch front axles give greater axle clearance than other graders, providing approximately twice the capacity of conventional axles for straddling large winrows, and that bulldozing of axles through materials is eliminated.

All three motor graders are powered by International Diesel engines, available with cable controlled push-button starting, and have a range of 8 forward and 2 reverse speeds. Identical in design, the models possess the same range of blade positions and are adaptable to all types of surface, ditch and bank work. Special bulldozers and snow plows have been designed as optional equipment for all three of the models.

Gun-Fil Lubricator

Manufacturer: Gray Co., Inc., Minneapolis, Minn.

Claims: Designed in four sizes, with lubricant capacities ranging from ½ ounce to 8 ounces, pressure filled Gun-Fil Lubricators automatically dispense oil or



grease in a measured, uniform flow to a moving bearing and stop feeding lubricant when a bearing becomes motionless. Six interchangeable valves are available with distinctive colored caps for identification. The valves with colored caps exert varying degrees of control of feed on greases of different densities.

Portable Lamp

Manufacturer: U-C Lite Manufacturing Co., Chicago.

Claims: This weatherproof Big Beam No. 11 portable electric hand lamp has single focus adjustment whereby it will deliver a spot or spread light. Weighing only 5 lbs. and powered by two standard drycell batteries, with pressure type connections, this lamp can be set down anywhere or clamped in a special hold-down fixture accessory for automobile trunks or prows of boats. It can

be used to fit industrial, commercial, utility, and emergency needs.

IH *Presents*

More Power
Greater Hang-on
Better Operating Economy

More Power! The horsepower of two models of International Diesel Power Units has been stepped up by 11% and 25% respectively — without increasing their size or weight — as the result of advanced engineering in the fuel combustion system. These are the 4-cylinder, 76-hp. UD-14A and 6-cylinder 125-hp. UD-18A Power Units. Power ratings are for *working* horsepower of the complete unit with fan, radiator and power take-off.

Greater Hang-on! When pulled down by overload, increased torque gives these Diesels greater "lug-ability." And they are built to take overloads in stride!

Better Operating Economy! Even with horsepower stepped up, these Diesels run cool under heavy loads and operate at new low cost per horsepower. A low rate of fuel consumption proves their efficiency.

Available Soon! Look for these newest International Diesels in the powered equipment soon available through your International Industrial Power Distributor. And ask him for the facts and figures on these models. He has them now.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

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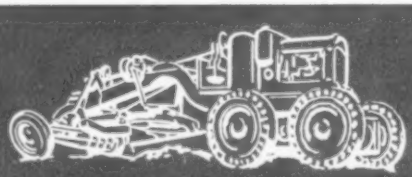
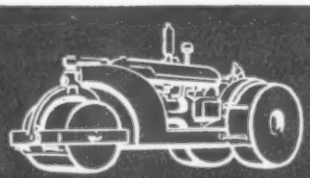


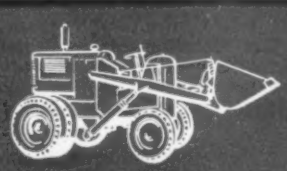


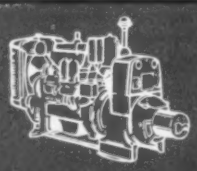
Another Advance in INTERNATIONAL DIESEL POWER

The UD-14A DieselPower Unit delivers 76 horsepower at 1400 governed r.p.m.

The UD-18A DieselPower Unit delivers 125 horsepower at 1600 governed r.p.m.

INTERNATIONAL *Industrial Power*





Shots from the FIRING LINE

New Mexico Enters 70 Road Contracts In Year

New Mexico's State Highway Department in its first post-war year of operation entered 70 road contracts totaling $9,072,906.19 and involving 774 miles of roads, four bridges and two underpasses, according to recent announcement.

Let since Sept. 14, 1945, the contracts included 30 federal aid projects bid in at $5,756,697.05 and 40 state projects, all started since the first of the year at $3,316,209.14. Not included in these sums are several projects carried out by state forces without contract.

It was pointed out that the bid prices quoted do not represent the entire cost of the projects, ten per cent being added for engineering costs, and the contractors are often called on for work in excess of the original specifications. The state frequently furnishes materials for construction that are not included in the contract bids, it was also noted.

Almost half of the work undertaken since the first of the year was on 100 per cent state funds to avoid delay and the hampering restrictions of federal participation, it was said. In federal aid work the state pays only 34 per cent of the cost of projects.

Highway Costs Decline from 1943 Peak

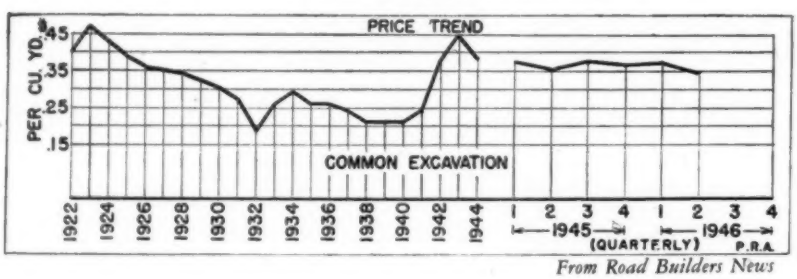
Federal aid figures on highway construction costs show a general leveling off in recent months. The only exception is the trend in the cost of structural concrete which has been generally upward since 1940, according to Road Builders News, publication of the American Road Builders Association.

Apparently, peak prices for concrete paving and common excavation were reached in 1943. The average cost for that year was 44 cents per cubic yard for common excavation and $2.78 per square yard for concrete pavement. For the second quarter of 1946, common excavation was 34 cents and concrete pavement was $2.63.

The price trend for a composite mile of federal and highway construction has also declined. The composite mile is a theoretical average mile which includes common excavation, paving, reinforcing and structural steel and structural concrete. The index peak was 126.9 in 1943 and had dropped to 117 in the second quarter of 1946. The index base was the 1925-1929 period which was 100.

Using this same base, the index for structural concrete has increased from 134.4 in 1943 to 158.8 in the second quarter of 1946. The costs per cubic yard for the same period are $30.00 and $37.00 respectively.

Price Trend for Common Excavation, 1922-1946



From Road Builders News

Set Two New Records at Anderson Ranch Dam

Two new records for placement of material in Anderson Ranch Dam were set in September, Construction Engineer Donald S. Walter advised the Regional Office of the Bureau of Reclamation in his regular monthly report. These records were for the largest amount of material placed in a single month and in a single day.

During September, 423,000 cu. yds. of material went into the structure, exceeding the previous figure of 411,700 established in August, Walter said. This amount would be sufficient to build an earth sidewalk three feet wide and four inches deep from Boise to within a few miles of New York City.

• **Open cut copper mining in the Karaganda steppe region, Siberia.** ***World News Services***

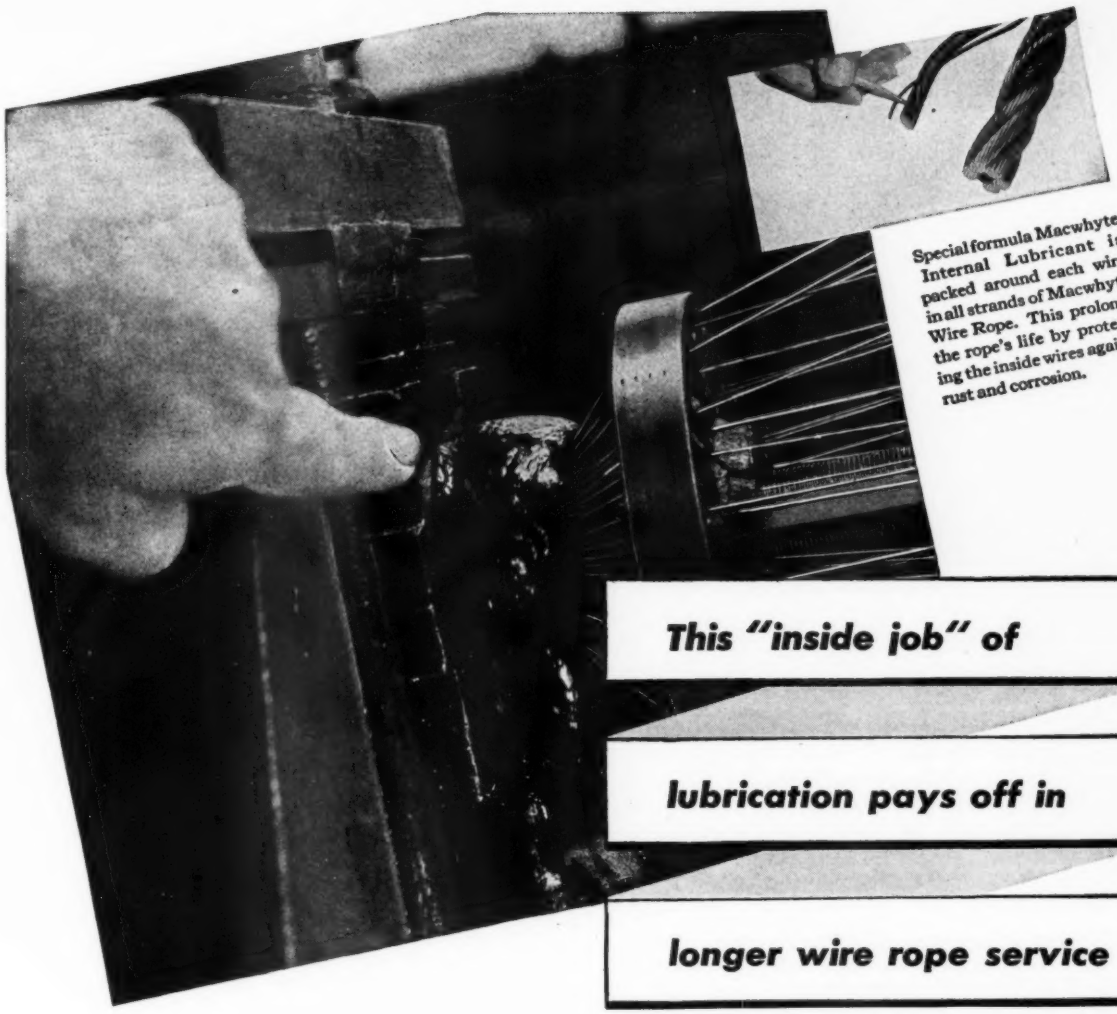
On September 18, with men and equipment working at top speed, 20,680 cu. yds. of material were added to the embankment of the dam by the Morrison - Shea - Twaits - Winston Company, contractors on the job. The two millionth cu. yd. to go into the structure this year also was placed in September, bringing the total embankment to approximately 8,500,000 cu. yds. When completed, the dam will contain 9,053,300 cu. yds.

Included in the September record total were 378,000 cu. yds. of earth, much of it brought a distance of two miles by a conveyor belt, 39,500 cu. yds. of rock, and 5,000 cu. yds. of riprap.

Anderson Ranch Dam when completed will be the highest earth-fill dam in the world and will store 500,000 acre-feet of water to supplement existing supplies in the Boise Valley. Power facilities at the dam will have an installed capacity of 41,500 kilowatts. The dam also will provide flood and silt control.

Use Coulee City Detour

A 2.3-mile detour in U. S. Highway 10-A, near Coulee City, has been opened so that vehicular traffic will not interfere with construction of the 10,000-foot South Dam of the Bureau of Reclamation's Columbia Basin Project,



Special formula Macwhyte Internal Lubricant is packed around each wire in all strands of Macwhyte Wire Rope. This prolongs the rope's life by protecting the inside wires against rust and corrosion.

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Because it's thoroughly lubricated *on the inside,* Macwhyte Wire Rope lasts longer on your equipment. Our heavy, tenacious, special formula lubricant gives long-lasting protection. It is force-fed to wires as they are being closed into the strand. All wires, both inside and outside, are thoroughly encased in lubricant.

Macwhyte Internal Lubricant improves the sliding action of the wires as they move in bending around sheaves and drums. It gives outside protection—but even more important, it protects the unseen inside wires which constitute the reserve strength and safety of the rope.

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Send for Macwhyte Wire Rope Catalog. Contains 170 pages of valuable information; lists Macwhyte's complete line. Ask any Macwhyte representative or write Macwhyte Company.

Make MACWHYTE your headquarters for WIRE ROPE AND SLINGS

• Bulldozer works over part of new four-mile access road being constructed through Western Montana forests to Hungry Horse Dam site.

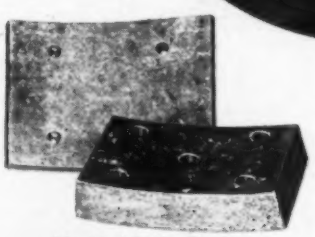
Bureau of Reclamation Photo

H. P. O'Donnell, resident engineer for the Bureau, said.

The detour, which will be used for the next 2½ years during the construction of the earth-and-rock barrier across the southerly end of the Upper Grand Coulee, was built by Bair & Crick, Spokane, holders of the $2,771,800 contract for the dam. The by-pass route is in excellent condition. Upon completion of the dam, Highway 10-A will be routed across the crest and the detour will be covered by irrigation water to be stored in the Coulee for the million-acre Columbia Basin Project.

GATKE BRAKE MATERIALS for TOUGH JOBS

GATKE Moulded Swing Friction



Moulded Brake Blocks

Tremendous Power—no let down when things get hot.

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Long Wear Life beyond comparison.

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Only 25 Toll Roads in United States

Our 25 motor vehicle toll roads, 240 toll bridges, 6 pay-as-you-enter tunnels, and 561 ferries yield approximately $96,000,000 in a normal travel year, yet these toll-ways are few when compared with our 3,300,000 miles of roads and streets and our tens of thousands of bridges, according to Charles M. Upham, engineer-director of the American Road Builders' Association.

Citing figures collected by the Public Roads Administration for 1940, Upham pointed out that all the toll roads in the United States total only 346.6 miles and that this includes the 160.7 miles of the Pennsylvania Turnpike which is the country's longest toll road and 46 per cent of our entire toll mileage.

The Wilbur Cross Parkway in Connecticut, 2.15 miles long, is the shortest public toll road. The longest private toll road is Heckscher Drive in Florida with 16.1 miles, and the shortest, the Mt. Agassiz Scenic Road in New Hampshire, is one mile long.

The 235.3 miles of public toll roads and 111.3 miles of private toll roads are all intra-state, while the other toll facilities, bridges, ferries and tunnels, are in many cases international as well as interstate. Toll roads are of several widths and surfaces. In width, they range from under 10 feet to 22 or more. There are 219.4 miles of the latter. The Pennsylvania Turnpike has two 24-foot lanes with a ten-foot dividing space.

Mr. Upham further noted that there were 17.5 miles of natural earth, 81.6 miles of shell or gravel, 42.4 miles of bituminous macadam and 205.1 miles of concrete. The earth roads carry fewer than ten vehicles a day. The better surfaces have the heavier traffic densities, with the concrete highways averaging 5,270 vehicles a day. The amount of traffic using all toll roads on a vehicle-mile basis is 3,251 vehicles daily.

As an indication of the change during the war, there were 271 toll bridges, tunnels and roads in operation in 1940. Figures for 1944 show 249 of these toll facilities, a reduction of 22 accounted for largely as changes from toll to free in the case of bridges.

In the general toll picture, four states, Arizona, Nevada, New Mexico and Utah have no toll facilities of any kind. Eight states, Delaware, Idaho, Indiana, Iowa, Kansas, Minnesota, Nebraska and Wisconsin, have no intra-state but one or more inter-state service. Kentucky leads the nation with 128 toll facilities, all bridges and ferries. New York is second with 78 which includes all forms, and Illinois rates third with 62 bridges and ferries, according to Upham.

Construction Machinery Shipments Show Decrease

Shipments of construction machinery during the first quarter of 1946 were

When a Bucyrus-Erie Bullgrader is mounted on an International TracTracTor, the all-important center of gravity does not change appreciably. There is no radical "balance-upset" to cause loss of power, excessive wear, or loss of the efficiency originally built into the tractor. Weight is properly distributed to give you full advantage of tractor power. Maintenance is low because digging loads are applied at the places designed to take them. All the speed, stability, and maneuverability of the bare tractor are still yours .... No wonder a Bucyrus-Erie Bullgrader in action is a picture of smooth efficiency. The operator can handle it easily without nosing down, gouging, jerking, or stalling. It digs its blade in and sweeps through the cut with the fast action that turns out accurate grades and record outputs. Drive is smooth, easy on the tractor. The whole length of the

tracks bears on the ground at all times for full tractive effort. Maximum power is concentrated at the blade . . . Performance like that will economically solve plenty of dirt-moving problems for you. That's why it will pay you to get complete information on Bucyrus-Erie Bullgraders from your International TracTracTor Distributor.

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valued at $65.6 million, according to a report released by the Bureau of the Census. These shipments were about 12 percent less than the fourth quarter 1945 shipments valued at $74.5 million.

The largest decrease in shipments in these two quarters was in tracklaying tractors, shipments of which declined from over $28 million in the fourth quarter 1945 to about $16 million in the first quarter 1946. More moderate declines occurred in road construction and maintenance machinery, and power cranes and shovels, shipments of which dropped four percent and three percent respectively. Shipments of road construction and maintenance machinery during the first quarter 1946 amounted to approximately $19 million and of power cranes and shovels to about $17 million.

Shipments of the remaining types of construction machinery increased during this period. The value of shipments of mixers, pavers, and related equipment amounted to $5 million, almost 37 percent higher than the fourth quarter 1945 shipments. Shipments of dozers increased 35 percent to $3.9 million and shipments of all other types of construction machinery rose an average of 86 percent to a total value of $5.1 million.

Factory shipments for export of construction machinery dropped during the first quarter 1946, largely due to declines in tracklaying tractors. In that quarter, factory shipments for export of all types of construction machinery, except power cranes and shovels for which no export data are available, were valued at $8.0 million, 16 percent of the total shipments of these items. During the fourth quarter 1945, 18 percent of the total shipments were for export.

Unfilled orders for construction machinery increased greatly during this period. Although data on unfilled orders are not available for power cranes and shovels, tracklaying tractors, and a few other types of machines, sizable increases were reported between December 31, 1945 and March 30, 1946 for almost all types for which data are available. For some types of machines, orders increased more than 100 percent. These data do not include figures on shipments or unfilled orders for parts and attachments for construction machinery, sold separately.

The dollar values of shipments represent, for all items except power cranes and shovels, the net billing price on an f.o.b. factory basis, after trade and quantity discounts have been deducted but before cash discounts have been deducted. The dollar value of power cranes and shovels represent the cost to the consumer.

Kaolin Production

The output of kaolin in 1945 was eight percent greater than in 1944, according to figures released by the Bureau of Mines, United States Department of the Interior. Sales of kaolin for use in refractories declined, but kaolin used in the manufacture of paper, rubber, linoleum, paints, and other products increased in 1945. Georgia furnished 75 percent of the tonnage, South Carolina 17 percent, and most of the remaining eight percent came from Florida, North Carolina, and Pennsylvania.

Kaolin found its largest use in the manufacture of paper, which took 59 percent of the total. Rubber clay, which increased 84 percent over 1944, was 12 percent of the total. Kaolin used in refractories decreased 13 percent and furnished 10 percent of the total. Pottery consumed eight percent, and the remaining 11 percent went into a variety of products as linoleum, chemicals, paints, plasters, and insecticides, The national average value as reported by producers was $9.65 in 1945, compared with $9.00 in 1944.

Million Yards Excavation on Washington Airport

Construction of the Schrom Airport, six miles northeast of Washington, D. C., was recently undertaken by F. W. Schrom, Greenbelt, Maryland, contractor, to accommodate the contemplated heavy air traffic for the nation's capital.

The project consists of slightly more than 1,000,000 cu. yds. of excavation, of which approximately 350,000 cu. yds. has been moved to date. The longest haul, estimated to be about 1600 feet, is being handled by four Allis-Chalmers HD-14C torque converter diesel tractors.

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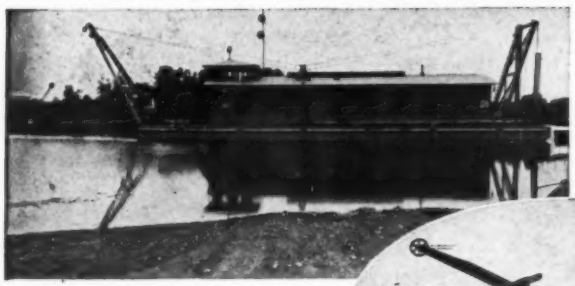
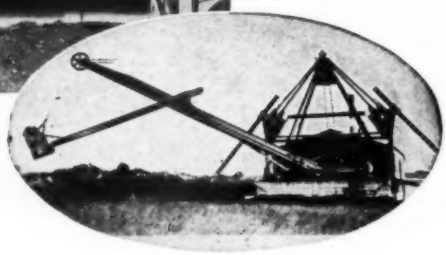


HYDRAULIC DREDGES
Sizes 8" to 15"



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YOU'LL MOVE MORE YARDAGE WITH "CATERPILLAR" SCRAPERS

HERE are facts—proved on the job—that show why the new "Caterpillar" Scrapers move *more* earth—faster—at *lower cost*.

BOILING ACTION. The design of the bowl and blade-edge boil earth upward through the middle instead of forcing it up and over the sides before the middle is full. That's why "Caterpillar" Scrapers load easier, top out better. This feature means more yards per hour. The blade cuts faster and easier on hard ground and contributes to central boiling action in the bowl.

SPREADING. The big apron opening is another feature of "Caterpillar" design. It gives positive, clean ejection. Results in faster unloading—no hanging up or sticking—and more trips per hour.

OVERSIZE TIRES. Scrapers pull easier on bigger tires. "Caterpillar" recognizes this and equips its scrapers with oversize tires. On soft ground, off the road, the larger tires permit lower inflation, more tread area to absorb the weight, better flotation and higher hauling speeds. That means easier hauling, increased yardage and lower costs—plus extra tire life.

STRONG CONSTRUCTION. Rugged design, superior materials and expert workmanship increase durability. These scrapers are built to last. They have welded construction and high-tensile steels throughout. Rugged-rib bracing of the heavy double-bottom plate is provided for increased strength and wear.

NEW "CATERPILLAR" CABLE CONTROL. Sure-acting and fast. Matched to the load. Oversize machined and heat-treated sheaves and correct reeving give longer cable life.

OPEN BOWL. "Caterpillar" design achieves maximum strength without the drawbacks of an overhead frame. The operator has good visibility for loading and spreading, and the scrapers can be shovel-loaded, an important feature on many jobs.

Factory production of the new "Caterpillar" Scrapers and Bulldozers is steadily increasing. See your "Caterpillar" dealer now—find out the advantages of a full line of matched earthmoving equipment—and get your order in early.

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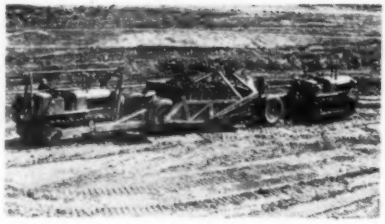
This model is introducing the hydraulic drive principle to the track-type crawler field.

In the master plan of construction, four runways, 5000 to 8000 feet long are contemplated in addition to administration offices, repair shops, hangars and air freight terminal buildings. Besides serving air cargo trade, the new field will handle passenger traffic, promote flight training, operate storage and rental facilities, and maintain sales and service quarters.

Although additional projects are being carried on in the District of Columbia and adjacent territory, this is the main project under construction.



• Allis-Chalmers HD-14C torque converter diesel tractors pull and push Gar Wood scraper on Schrom Airport job near Washington, D. C. Longest haul is about 1600 ft.

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What material do you plan to dig or handle?
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Give us the answers, and we will give you details on the Blaw-Knox Bucket most efficient for the job . . . Over 100 types and sizes to choose from at Blaw-Knox—Bucket headquarters.
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American Society of Civil Engineers Meets in K.C.

The Missouri Valley Basin Project and other civil engineering subjects were discussed at the Fall Meeting of the country's oldest national engineering organization, the American Society of Civil Engineers at Kansas City, Oct. 16-19.

Eight technical sessions and an excursion of engineering and historical interest were scheduled in addition to social functions which included a luncheon and dinner the opening day and special entertainment for wives of members.

Members of the 93-year-old Society came from all parts of the country, representing the Society's 65 Local Sections. A Local Sections Conference on October 14-15 preceded the general sessions, with official representatives in attendance from 26 sections.

Forty-six universities and colleges between the Canadian border and Mexico and Ohio and the Rockies, participated in a Student Chapter Conference. There are 123 such Student Chapters affiliated with the American Society of Civil Engineers.

Construction Jobs Now 80% Safer than 20 Years Ago

A construction worker's job is 80 per cent safer than it was 20 years ago.

Edgar N. Goldstine, San Francisco consulting safety engineer, made that report to the construction section of the National Safety Congress' annual convention of the National Safety Council in Chicago in October.

He attributed the marked improvement in accident prevention in this particular activity to establishment of proper safety programs which require instruction and training in correct working methods and practices, accident prevention inspections, investigations of serious accidents, installation of mechanical safeguards, first aid treatment, accident and hazard analysis, and general continued emphasis among workers on the necessity for safety.

The private contractor's accident frequency rate in 1939 was 60.91, the speaker said. After the inclusion of mandatory safety and health requirements in all government contracts, the rate dropped progressively until it reached 9.25 in 1945.

Says Army Mission Is Resource Development

"The first mission of the United States Army is now, as it always has been the preservation of our peace and welfare. One of its functions, sharply distinguishing it from any militaristic organization, is the development of our national resources and the betterment of life for our citizens. Here in the Mississippi Valley area you have plain proof of the unique position of our Army in our national life," Secretary of War Robert P. Patterson said in a recent talk at Vicksburg, Miss.

Thermoid – For Progress in Industry

The old-fashioned hand gun was a great advance over the oil can and grease paddle. But it was still slow and lubricant-penetration was uncertain.

Just pit the antique method above against this modern, powerful portable greasing unit for servicing all types of automotive and construction equipment on the job. The compressor here delivers pressures up to 200 lbs. which may be boosted on the hydraulic side to as high as 10,000 lbs. per square inch! Thermoid wire braid hydraulic hose carries this load with ease.

HELPING the planners of tomorrow's products and methods is just one of Thermoid's services to industry. Without the development of a hose capable of extremely high pressures, the above pictured greasing unit would still be an "inventor's dream." The production of Industrial grease and hydraulic control hose is the answer to many difficult problems. There's an answer waiting at Thermoid for your special hose problems, too.

Get in touch with your local Thermoid Jobber or direct factory representative. 60 years of research and industrial rubber know-how are at your beck and call for problems relating to all kinds of hose, belting and friction materials.

THE THERMOID LINE INCLUDES: Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Sheet Packings • Industrial Brake Linings and Friction Products.

Thermoid Rubber

DIVISION OF THERMOID COMPANY

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Contributor to Industrial Advancement Since 1880

• Morrison-Knudsen Co. of Boise, Idaho, uses Bucyrus-Erie 2½ cu. yd. dragline to pull down rocks to be used to build an access road to the site of Kortes Dam.

"Over at Clinton, the Corps of Engineers is building the largest hydraulic model ever built by man. Within its 200 acres, all main streams of the Mississippi River watershed—an area extending from Montana to Texas, and from the Rocky Mountains to Texas, all variations of terrain from sandbar to mountain mass, all existing and proposed flood control reservoirs as well as levee systems, dikes, floodwalls, floodways and other pertinent works, will be produced to scale. Nothing like it has ever been attempted anywhere by government or industrial enterprise.

"The Army Engineers are capsuling one and a quarter million square miles of drainage area, contained in 28 states, into a field laboratory so that we may learn how to harness the rivers of the Mississippi basin for the benefit of the American people. Within a year, it is expected, the lower half of the project will be completed and in operation. The entire project is scheduled to be ready in 1948. Then another all-Army contribution to a better and fuller all-American life will be at work for the nation.

"The United States Waterways Experiment Station, an agency of the Corps of Engineers, here at Vicksburg, is devoted to the analysis-by-experiment of problems arising from the action of water and soil. Although it was established by Act of Congress in 1928, after the flood of the previous year, to plan flood control of the Mississippi, its field now has been extended to the entire United States, conducting investigations in water hydraulics and soil mechanics for the Navy and other public and semi-public agencies.

"This down-to-earth concern with the raw materials of our country—its soil and water—applying all the know-how of military engineering to the solution of civic problems, not in any way concerned with the prosecution of war, is typical of our peacetime Army. As an agency of the people, it works for the people in any sphere to which it may

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Williams Type BUCKETS

• Wellman leads the field in welded bucket construction. Wellman improved design means *better service, lower cost for you!* A type for every purpose: Multiple Rope, Power Arm, Dragline, Power Wheel, Special Service; ⅜ to 16½-yd. capacity.

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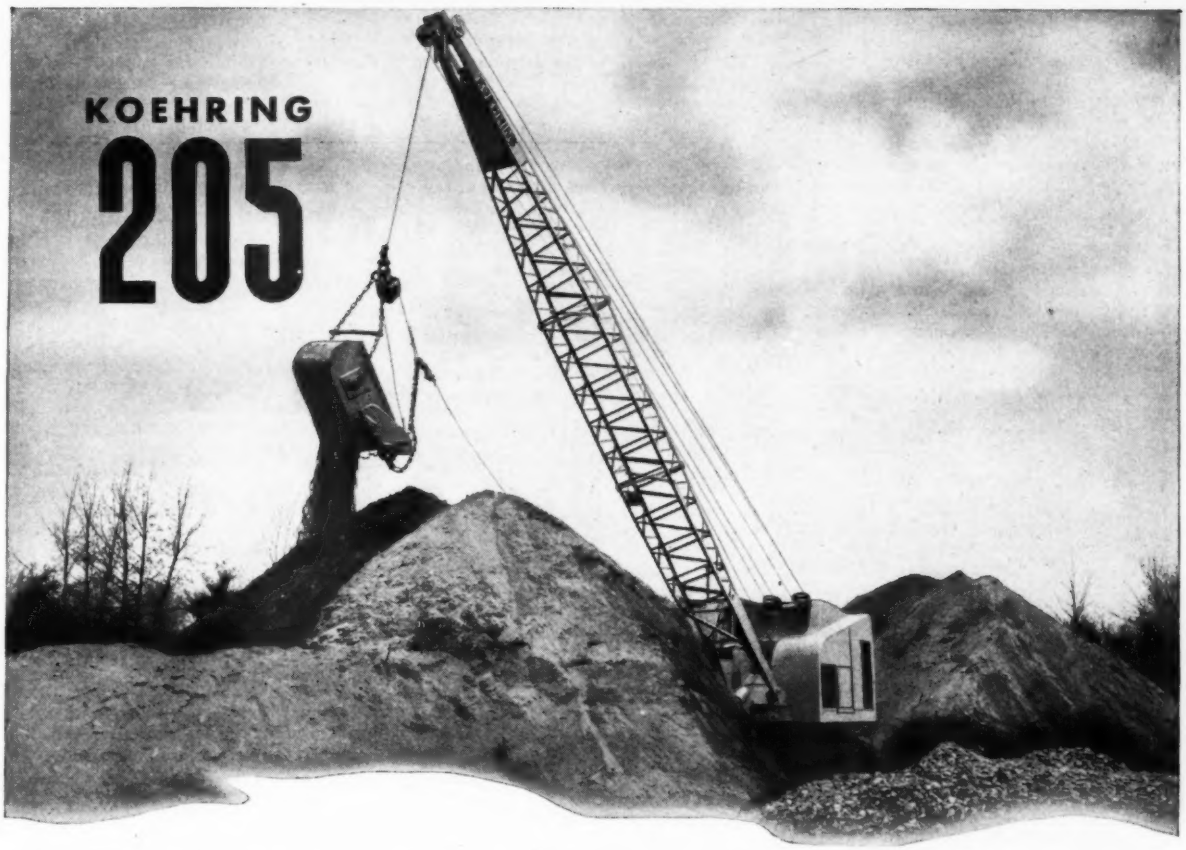

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because it's KOEHRING HEAVY-DUTY

EVEN without the name plate you can tell the 205's a Koehring . . . every detail says: "Heavy-Duty". This means to you: Toughness to stand up to any job the future may bring, lower maintenance cost, more output, bigger earnings.

And don't think because the 205 is exceptionally rugged and strong that it's slow and cumbersome. It's ALL modern . . . the first half-yard built by Koehring . . . all new from the ground up. It's fast, convenient, alert in response to controls. Quality materials are used and dead weight is engineered out so as to combine speed with strength.

Keep out in front with Koehring — you make more money easier with quality . . . pick the Koehring 205 Heavy-Duty.

Other Koehring Heavy-Duty Construction Equipment includes . . .

304 Excavators (¾-yd. Shovel)
605 Excavators (1½-yd. Shovel)
Dumptors

twinbatch Pavers
Unibatch Pavers
Longitudinal Finishers

Concentric Zone Mixers
Construction Mixers
Mud-Jacks*
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KOEHRING COMPANY • **Milwaukee 10, Wisconsin**
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HEAVY-DUTY CONSTRUCTION EQUIPMENT

be assigned. Its goal is the security of the nation.

"The accomplishment of the Army's mission in all fields of security demands cooperation and effort by every American. Because it is an essential part of our democratic life, and not a militaristic despotism foreign to and isolated from the other institutions of our nation, it needs the interest and support of the people to do its work.

"Our pride in its achievements, both in war and peace, should assure a continuing interest in its work. Self-interest in our own welfare should guarantee the Army our hearty support. But since interest and support to be effective require some self-sacrifices, the final measure of the Army's success will be the measure of our patriotism, our willingness to place our individual inclinations second to the common good.

"Your Armed Forces are now engaged in the enforcement of your victory and the establishment of a secure world, free from the scourge of war. On their success depends the happiness and peace of the whole nation. But their success depends on each of us, on our will to support them to whatever extent is necessary. No American who values patriotism as a national virtue will fail them."

Valencia to Widen Streets

The city of Valencia in Venezuela plans to spend $3,000,000 immediately on city improvements, including the widening of downtown city streets! The city, state and federal government will contribute funds. Plans for the improvements were studied several months by a committe headed by Emiliano Azcunez.

Plan New Road Between LaGuaira and Caracas

The Venezuelan government has set aside $8,000 for a commission to study feasibility of a new highway between La Guaira and Caracas. The present road is a narrow, winding 23 mile lane which takes one and one half hours to negotiate by automobile. If government plans go through, a new wider, direct road would be built, cutting the mileage to eight. Considerable tunneling would be necessary, but engineers think the project is feasible. The present road was built about 25 years ago at a cost of more than $20,000,000. La Guaira is the seaport for Caracas, capital city of 500,000 persons, and the home of the International Airport.

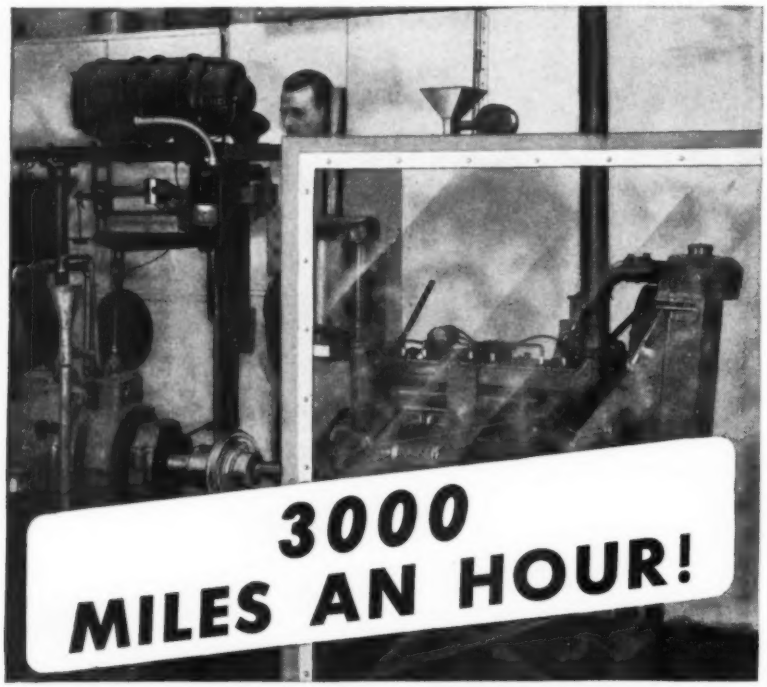
Surplus Construction Machinery Moves Slowly

That disposal of many millions of dollars worth of surplus construction machinery by the War Assets Administration "has been and is being log-jammed by a governmental bureaucracy that fails to see the forest of national economy for the trees of red tape and political considerations," Frank B. McBath, of Portland, Ore., president of Associated Equipment Distributors, told a group of that organization's officials gathered in Washington to consider the whole situation involved in past and present policies of government disposal of construction machinery.

Mr. McBath told his group that WAA Administrator R. M. Littlejohn "is sincerely trying to do a good job, but he came into the picture after several preceding administrators and governmental agencies had gotten the whole surplus picture into such a mess that not even a miracle man can straighten it out with benefit and profit to the many prospective purchasers whose cumulative buying, at a time of unprecedented short supply, would have been highly beneficial to the national economy."

A.E.D.'s President drew attention "to illustrate what I mean by political considerations" to a new National Housing Administration priorities regulation freezing in the name of "The Veterans' Housing Program" all surplus batching plants, cranes and shovels up to 2½ cu. yds., ditching machines, motor graders, portable air compressors, rock crushers, track laying and wheel tractors, and tractor type scrapers.

"Nobody disputes the fact that no stone should be left unturned to provide comfortable and economic housing for veterans", McBath said, "however, there seems to be some justification for the argument of many well-informed authorities that the term 'veterans' housing' is being used as a



Actually, that Donaldson Air Cleaner-equipped engine is enclosed in a dust-tight box, bolted to a concrete stand in the Donaldson laboratories, and doesn't move an inch. But during a certain hour-long test, the air cleaner is fed as much dust as it would ordinarily handle in 3000 miles of truck or bus service.

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1. No dust is fed to either engine or cleaner to determine engine wear factor.
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Such tests with Donaldson Air Cleaners assure you of efficient, dependable dust protection.

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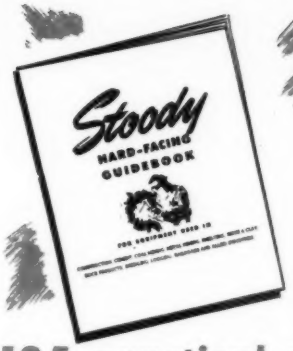

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show where and how to apply hard metal in most economical manner, yet produce greatest life increase.

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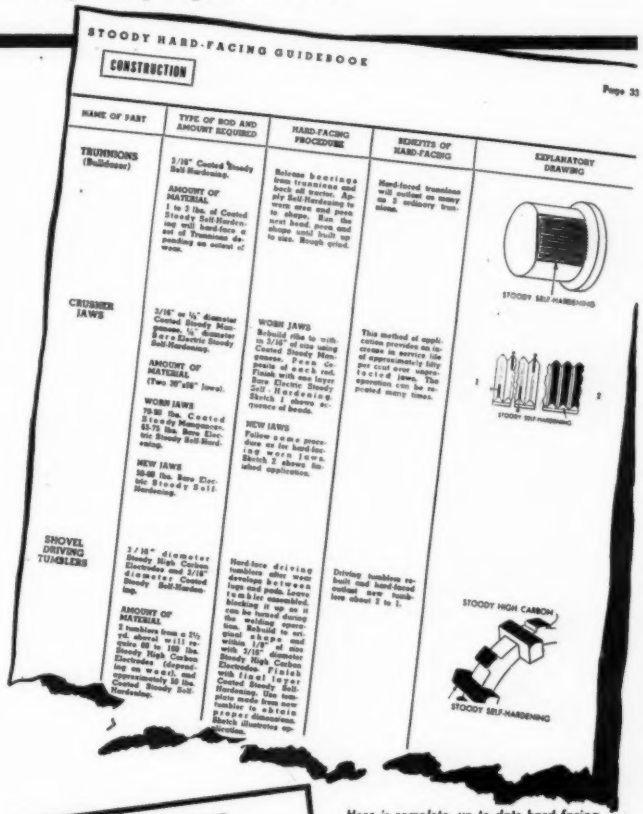

STOODY HARD-FACING GUIDEBOOK

CONSTRUCTION

Page 33

NAME OF PART	TYPE OF ROD AND AMOUNT REQUIRED	HARD-FACING PROCEDURE	BENEFITS OF HARD-FACING	EXPLANATORY DRAWING
TRUNNIONS (Bulldozer)	3/16" Coated Stoody Self-Hardening. AMOUNT OF MATERIAL 1 to 2 lbs. of Coated Stoody Self-Hardening will hard-face a set of Trunnions depending on extent of wear.	Balance bearings from trunnions and bush all tractor. Apply Self-Hardening in worn area and pass to shape. Run the next bead, peen, and shape until built up to size. Rough grind.	Hard-faced trunnions will outlast an many as 3 ordinary trunnions.	STOODY SELF HARDENING
CRUSHER JAWS	5/16" or ¼" diameter Coated Stoody Manganese, ¼" diameter Bare Electric Stoody Self-Hardening. AMOUNT OF MATERIAL (Two 30"x36" Jaws). WORN JAWS 70-80 lbs. Coated Stoody Manganese, 65-75 lbs. Bare Electric Stoody Self-Hardening. NEW JAWS 35-40 lbs. Bare Electric Stoody Self-Hardening.	WORN JAWS Rebuild ribs to within ½ to 3/16" of size using Coated Stoody Manganese. Peen Deposits of each row. Finish with one layer Bare Electric Stoody Self-Hardening. Sketch 1 shows sequence of beads. NEW JAWS Follow same procedure as for hard-facing worn jaws. Sketch 2 shows finished application.	This method of application provides an increase in service life of approximately fifty per cent over unprotected jaws. The operation can be repeated many times.	STOODY SELF-HARDENING
SHOVEL DRIVING TUMBLERS	3/16" diameter Stoody High Carbon Electrodes and 3/16" diameter Coated Stoody Self-Hardening. AMOUNT OF MATERIAL 2 tumblers from a 2½ yd. shovel will require 80 to 100 lbs. Stoody High Carbon Electrodes (depending on wear), and approximately 80 lbs. Coated Stoody Self-Hardening.	Hard-face driving tumblers after wear develops between lugs and pads. Leave tumbler assembled, blocking it up as it can be turned during the welding operation. Rebuild to original shape and within 1/8" of size with 3/16" diameter Stoody High Carbon Electrodes. Finish with final layer Coated Stoody Self-Hardening. Use template made from new tumbler to obtain proper dimensions. Sketch illustrates application.	Driving tumblers rebuilt and hard-faced outlast new tumblers about 2 to 1.	STOODY HIGH CARBON STOODY SELF-HARDENING

Here is complete, up-to-date hard-facing information on maintaining your wearing equipment. No tedious reading, no unproven theories. Clear, easy-to-understand illustrations. The new guidebook pages are chock full of equipment-saving applications, using Stoody Hard-Facing alloys. This page is typical of those you'll see in the new Stoody Hard-Facing Guidebook.

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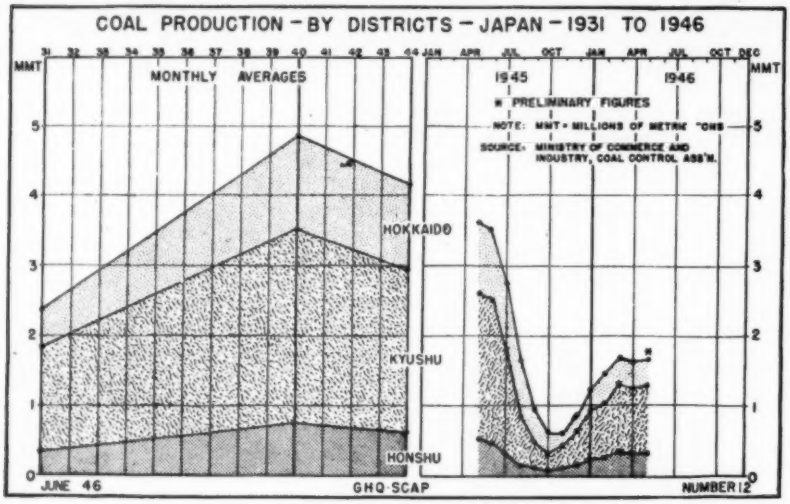


smokescreen for purposes that have nothing to do with providing housing for our service men."

"The distributors of construction machinery are seriously affected by this situation. Much of the machinery now frozen by NHA edict, is actually needed more for heavy construction than for the residential type of construction. If NHA persists in its apparent determination to channel all construction materials and machinery into housing for veterans, with no consideration to other construction needs of industry, public works, etc., then the conclusion cannot be escaped that the needs of an adequate housing program for veterans have been distorted and magnified into proportions entirely out of balance with a well organized national economy. If this is so, then either the ability or sincerity of our national politico-economic thinkers and planners may be logically questioned.

Shortly after VJ-Day, distributors began looking forward to obtaining as surplus a sizable quantity of the millions of dollars worth of bulldozers, cranes, shovels, paving machines and other construction machinery still crated under Government order in factories or at ports awaiting shipment to various war zones. Prompt acquisition of such surplus, or even a modest part of it, would have been a great boon to distributors who had had nothing to distribute for several years but who, also, were doing their part to win the war.

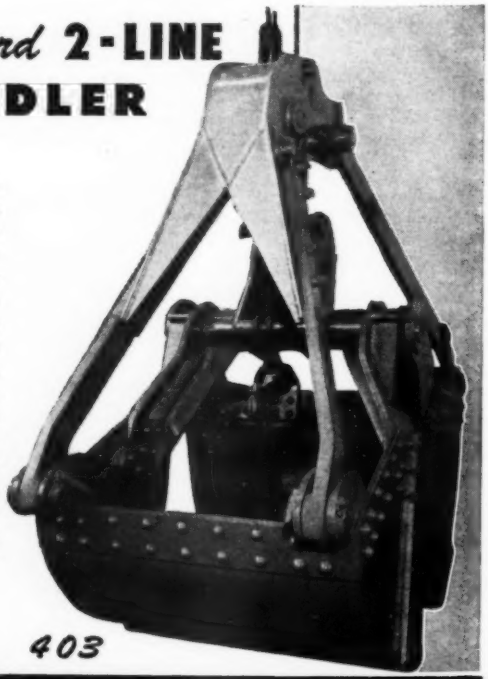
"Putting this surplus construction machinery to work, soon after the war, would have been registered in long-delayed Federal, state and municipal public works programs, in the badly needed repair and construction of roads, streets, public buildings, waterworks, schools, hospitals, etc. But because of red tape to end all red tape, misinterpretation by various surplus property top-drawer functionaries, of the intent of Congress, and other bureaucratic processes, the flow of surplus into productive channels was a thin trickle that produced no gain or advantage either for industry or for the taxpayer.

"Administrator Littlejohn has announced a stem-to-stern shake-up of WAA's field offices, aimed at disposing of all-Government surplus by June, 1947. 'Tis a consummation devoutly to be wished.' I have my fingers crossed. Seeing is believing. With the National Housing Administration freezing all important construction machinery, the situation looks hopeless. That important segment of the nation's construction industry concerned, not with residential housing, but with roadbuilding, industrial construction, flood control, reclamation, rivers and harbors projects, etc., will apparently have to forget surplus property entirely and mark time until the manufacturers, themselves beset with labor and material shortage difficulties, can begin to catch up on production.

Last June, A.E.D.'s Board of Directors adopted a resolution charging that the Surplus Property Act was failing to function effectively and that "due to cumbersome procedures which are required by law, and the necessity for satisfying various groups or priority and preference holders, interminable delays are unavoidable." "Moreover," the resolution continued, "the system of priorities and preferences established by the Act leads to the exploitation of priority and preference holders and puts a premium on fraud and dishonesty, and is therefore not functioning in accordance with the twenty objectives of the Act, or the original intent of the Act."

The urgency of the problem as it affects distributors of construction machinery has resulted in the appointment of Frank Knight, A.E.D. assistant secretary, as secretary of the organization's Committee on Disposal of Government Surplus, of which Ed P. Phillips, of Richmond, Va., is chairman. Mr. Knight is working directly with officials of WAA handling construction machinery, and advising A.E.D. mem-

ERIE *Standard* 2-LINE REHANDLER



THIS compact Lever Arm Rehandler Bucket of normal proportions has ample closing power to fill to capacity in compact materials, and is so designed that the reeving can be adjusted to obtain maximum speed with capacity grabs in loose materials. We have reduced the "height open dimension" thus requiring minimum headroom, enabling you to pile higher and to discharge into higher hoppers. Lighter weight alloy construction provides more pay load (scoop contents) less bucket dead weight. To see this bucket in all detail write for bulletin 403.

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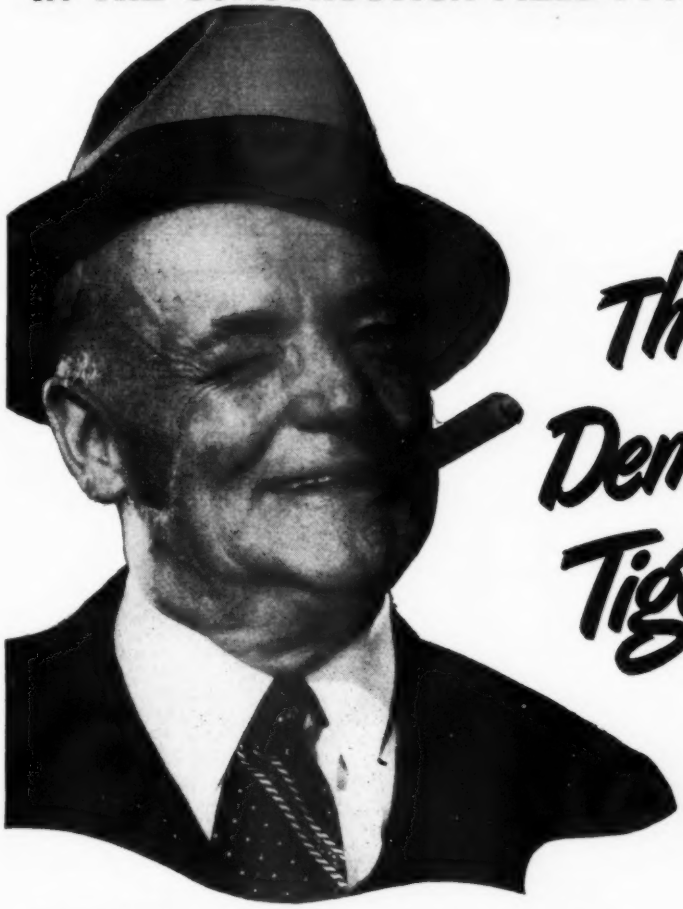

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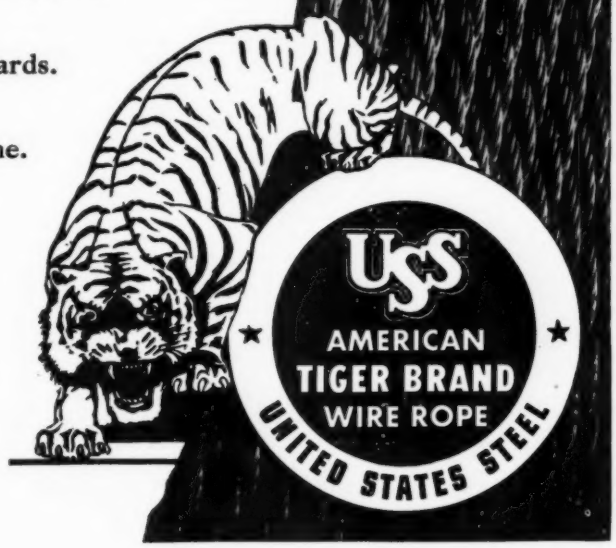

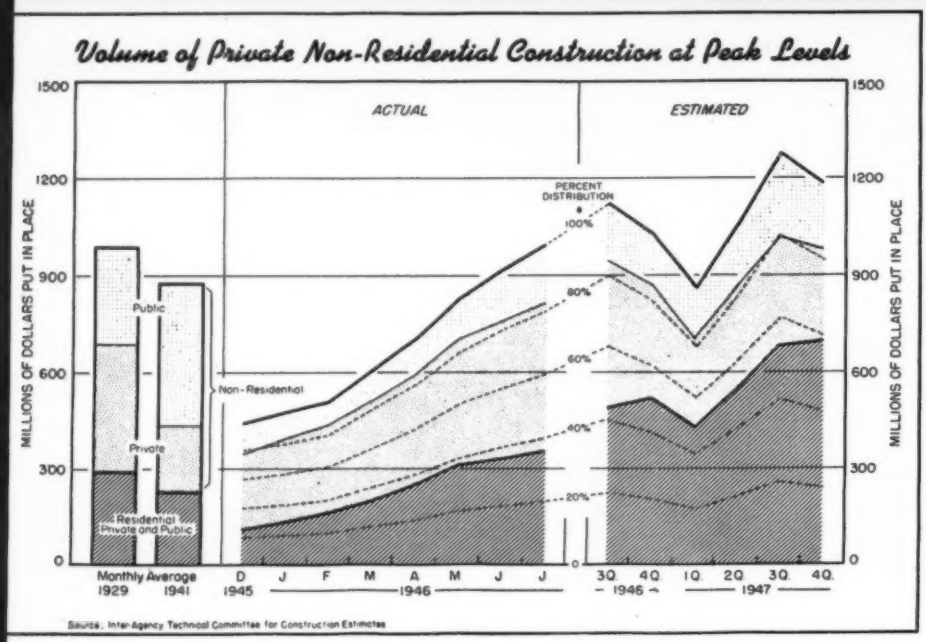

bers through special memos of WAA procedure, places and dates of sales, and generally spearheading a program designed to assist members of the organization in obtaining any available surplus for their areas. Concurrently with Knight's assignment to this task, F. Gerald Moyer, until recently Assistant Director of WAA's Sales Group 1, Office of General Disposal, has been appointed Field Representative to A.E.D.'s Committee on Disposal of Government surplus. Mr. Moyer, who has worked on all phases of the surplus program since Treasury Procurement to W.A.A. will function in a public relations capacity in all A.E.D. matters affecting surplus property, meeting with the organizations members and local and regional groups, with WAA officials, and with commodity men in the Central and Regional WAA offices.

The Sauerman Tower Machine that looms up in the background is completing a basin 1250' long, 360' wide and 30' deep which it dug for a sewage treatment plant. The machine loaded the spoil into dump carts for haulage to a fill.

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Engineering to Provide Greater Traffic Safety

Engineers can now design highways which will cut our present rate of traffic accidents by 76 per cent—"and here are figures to prove it"—Charles M. Upham, engineer-director of the American Road Builders' Association, Washington, D. C., told the third annual convention of the Eno Foundation for Highway Traffic Control, a traffic engineering affiliate of Yale University, at the Waldorf Astoria.

Mr. Upham cited an accident survey conducted in New Jersey by Highway Commissioner Spencer Miller, Jr. This comparison of New Jersey accident figures before and after engineering changes revealed that seven types of improved design resulted in an overall reduction of 76 per cent. These design features were as follows:

1. Separated streams of traffic with wide lanes dividing all streams which travel in opposite directions. This practically eliminates head-on collisions and side-swipe accidents, Mr. Upham pointed out.

2. The elimination of all direct intersections between railways and highways.

3. Wide, smooth, stable shoulders level with the pavement in open areas to enable motor vehicles to park completely off the paved strip and to give elbow room in cases of emergency.

4. A careful control of commercial enterprises along the highways.

5. The exclusion of pedestrians from certain heavily travelled roadways.

6. Definite and adequate standards of design which both care for present speeds and allow for possible increased speeds in the future.

7. A provision of specially designed entrance and departure "cloverleaves" to insure safety and avoid traffic confusion.

"Highway construction had to span an entire continent with tremendous speed and comparatively little money," Upham said, "and when this first construction was going on, far fewer motor vehicles needed to be accommodated—and at far lower speeds."

The number of motor vehicles, and their speeds, have moved beyond the capacity of many roads which were adequate in their day. But the highway engineer's knowledge of design has progressed side by side with automotive design, Upham, who was American delegate to the Eighth International Highway Conference at Geneva, pointed out. The need now, he said, is to get materials and remove production bottlenecks so that new highway design can do its part to save lives and money and time, and to produce a road-United States for safe travel and efficient travel.

"The seven design improvements previously listed," Upham told engineering and enforcement delegates to the Eno convention, "apply also to rural highways. While traffic is two-thirds less at night than in the daytime, 48 per cent of all accidents occur

at night. Highway lighting, therefore, is highly important in saving lives and property."

Particular danger points are approaches to metropolitan areas, highways running through villages, and locations which have hazardous circles, intersections, bridges and grade crossings.

To make full use of modern highway engineering, Upham called upon delegates at the convention to form authoritative committees to study and promulgate traffic standards.

Many agencies are now developing corrective practices, but there is no clearing house where these bodies can compare, discuss and adopt the best methods. Mr. Upham proposed that in a campaign for utilizing the **know-how for built-in safety**, the Eno Foundation for Highway Traffic Control, Inc., was ideally suited to act as such a clearing house.

Mr. Upham further advised that a committee organization carefully study all factors. This would include three general committees on Education, Enforcement and Engineering. He suggested eight sub-committees: (1) Alignment (2) Roadway Cross Section (3) Highway Intersections (4) Guardrail (5) Traffic Control Devices (6) Highway Illumination (7) Roadway Surfaces and (8) Standardization of Determination on Safe Speeds of Present Road System.

Overton Heads Mississippi Valley Flood Control Group

U. S. Senator John H. Overton of Louisiana was elected president of the Mississippi Valley Flood Control Association at a meeting held in Washington, D. C. Fred D. Beneke, Memphis, Tenn., was re-elected secretary-treasurer.

Stop Downward Housing Construction Volume

The steady decline in investment commitments for new housing construction, as revealed in contracts awarded, from the high level of $463,600,000 in May, was arrested in August in the 37 states east of the Rocky Mountains, it was reported by F. W. Dodge Corporation, a fact-finding organization for the construction industry.

The Dodge corporation reported, however, that a downward residential building contract spiral occurred in August in New England, metropolitan New York and northern New Jersey, in Louisiana and Mississippi, in Minnesota, the Dakotas, and in the St. Louis marketing area comprised of eastern Missouri, southern Illinois, western Tennessee and Arkansas.

The gains in other areas were sufficient to bring the overall volume of new residential contracts during August to $284,025.000 compared to $281,227,000 in July. The greatest gains were in the Southeastern states, Ohio and Kentucky, southern Michigan, upstate New York and Texas. It was revealed that 39,953 dwelling units are to be provided under the contracts awarded last month.

• Henry Bickel & Co., Louisville, Ky., use Bucyrus-Erie ¾ cu. yd. shovel and ¾ cu. yd. clamshell to level site of parking lot in downtown area of Louisville.

Contracts awarded for nonresidential construction and heavy engineering works declined from $436,764,000 in July to $395,884,000 in August. The total of all building and construction contracts awarded in August in the thirty-seven eastern states was $679,909,000 compared with $717,991,000 in July. Thirty per cent of the August volume was classified as publicly-owned.

Governor Promises Corrective Action on California Roads

Promising corrective action, Gov. Earl Warren told the League of California Cities, at its recent annual convention in San Diego, that California's state highway system, built when the

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• Water main trench for student-veteran housing development at Ohio State University. Top: Framework in right background is of one of ten 80-person units. Below: Moved up close to one of the housing units, a Bucyrus-Erie ¾-cu. yd. dragshovel takes initial bites in a new part of the trench.

state's population was only half what it is today, is "literally breaking open at the seams."

He revealed that California highway construction contracts totaling $52,000,000 have been awarded since last November, and declared that awards up to $135,000,000 will be made "as rapidly as the construction industry can absorb them during the next two years."

An interim state legislative committee, he added, is expected to present facts to the 1947 California Legislature upon which "a sound and forward looking program" can be based for modernization of the state's entire road system.

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A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

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Dragshovel Aids Veterans' Housing Project in Ohio

Housing of student veterans at Ohio State University, where enrollment has jumped to 25,000 from 15,000, is by no means completely solved; but the shortage is being alleviated by a ten-unit project providing space for 800 veterans just off Olentangy Blvd., near the university stadium in Columbus.

One of the problems of the new project—that of bringing in the water supply for the new housing units—was met by digging 5000 lineal feet of trench to intersect the city water main which follows the boulevard.

Contractor on this 6500-cu. yd. excavating job was H. E. Miller, whose ¾-cu. yd. Bucyrus-Erie dragshovel completed the three-foot wide and five-foot deep trench on the week following its start. Backfilling was handled by an International TD-9 tractor equipped with a Hughes-Keenan blade rigged on the back end.

Ball Clay Sales Increased

Sales of ball clay in 1945, reported to the Bureau of Mines, United States Department of the Interior, were 12 percent higher than in 1944, and 12 percent lower than in 1941, when ball clay reached an all-time record of 198,445 tons. The Tennessee-Kentucky field furnished 93 percent of the total output; Tennessee accounted for 47 percent, and Kentucky 46 percent. The remaining 7 percent came from New Jersey and Maryland.

Over 90 percent of the ball clay output in 1945 was sold for use in pottery, five percent in high-grade tile, and the remainder in a variety of uses such as saggers, terra cotta, and refractories. The requirements for pottery in 1941 were 150,253 tons; in 1942, 138,332 tons; in 1943, 133,337 tons. In 1944 there was an increase to 139,483 tons, and in 1945, the sales of ball clay for this purpose were 158,419—passing the 1941 record.

The average value reported by producers to the Bureau of Mines was $9.11 in 1945, compared with $8.84 in 1944.

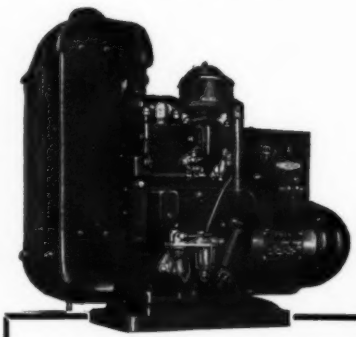
Vets to Get On-Job Training For Highway Positions

Kentucky veterans who wish to take "on-the-job-training" in the Kentucky Department of Highways now have the opportunity, J. Stephen Watkins, Commissioner of the Department announced. Thirty classifications have been approved by the Veterans Administration, ranging from junior highway engineer to truck driver or clerk, W. R. Milward III, Director of Personnel for the Department stated.

Veterans must first apply to the Veterans Administration to procure a certificate of eligibility. The Department will pay the veteran its established rate for the work to be done, in the classification which will provide the necessary training to lead to advancement to the position desired. A scale of additional pay is provided in the program for the veteran to continue for a period specified in the law.

Junior highway, materials and design

(Continued on page 646)



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CAPACITY RANGE: 350 to 35,000 Watts.
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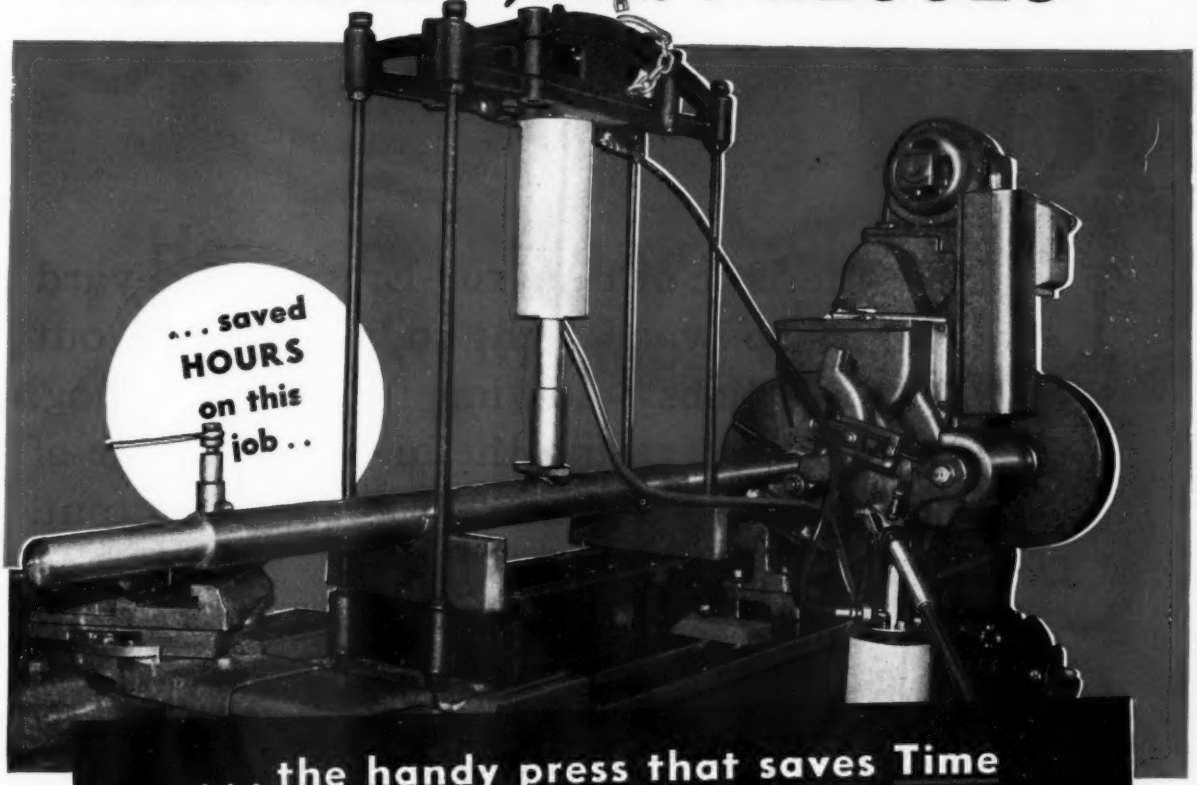

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A portable, all-around press of 1001 uses . . . that's a Rodgers.

For example, here is how it saved hours of time and labor on the above job — straightening shafts:

The shafts were 92″ long x 3½″ dia. and had to be perfectly straight for threading and finishing of ends. They were put on lathe centers, turned to establish the high spots and then placed between the V-blocks on the Rodgers Universal and pressed until the shaft was true. Then the V-blocks were removed, shaft placed on lathe centers again and finished.

The Rodgers Universal remained on the lathe bed while all of many shafts were finished — some of them 120″ long x 5½″ dia.

***Think of the saving* — no handling and re-handling off and on the lathe — and it gave them a truer shaft, a better finished job.**

Perhaps your problem isn't shafts — but if you have miscellaneous pressing, pulling, forcing, jacking or clamping work around your shop, you will find a Rodgers Universal Press a mighty handy tool to have. Check into it — today, by writing for complete details.

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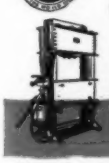
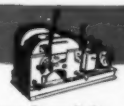

Shop Presses

Crawler-Track Presses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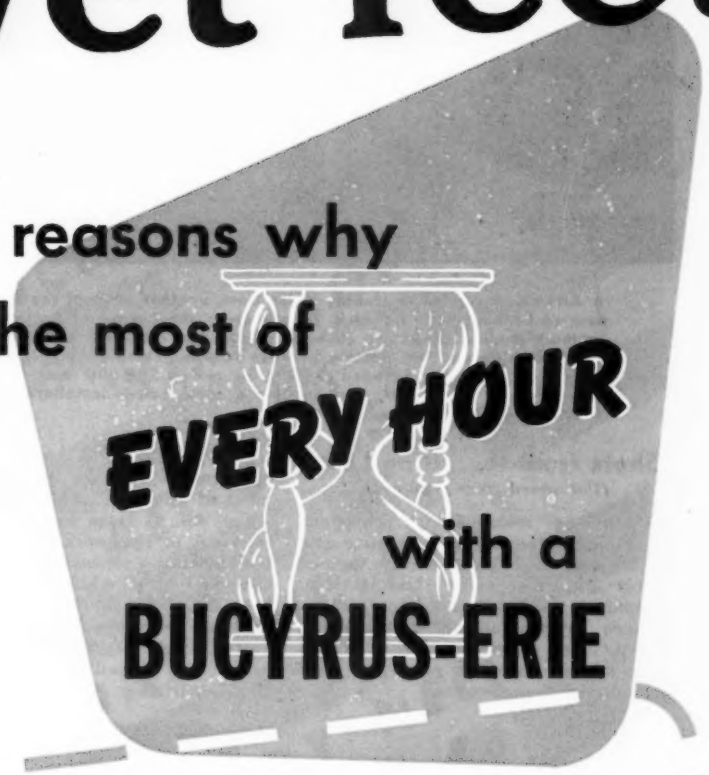
for wet feet

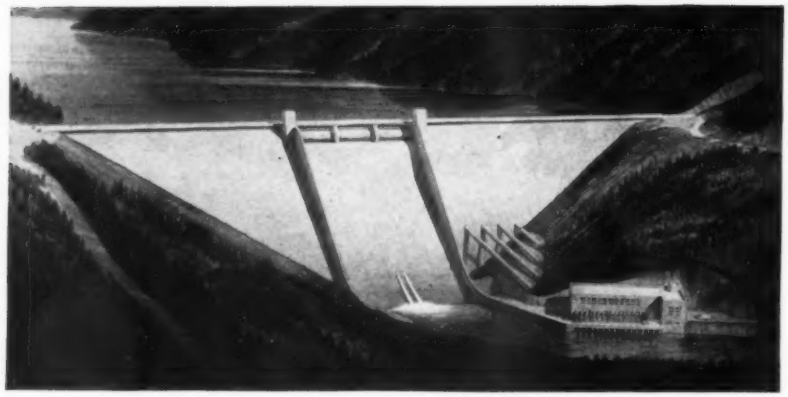
Here are 8 reasons why you make the most of EVERY HOUR with a BUCYRUS-ERIE



1. All adjustments are easily made and lasting.
2. Parts are simple, large, few in number and enduringly aligned—there's little to go wrong.
3. Machinery is accessible for quick, easy repairs, parts replacement, and lubrication.
4. The digging cycle is balanced, coordinated, fast. There's no overstressing of parts to cause too-frequent adjustments and repairs.
5. All controls are conveniently grouped in one place—no hopping about the machine to cause digging delays.
6. Performance is smooth, quiet—easy on both machine and operator.
7. Design is individual—each machine is especially fitted to its range of work.
8. Moves are fast, sure. Machine is easily steered, makes sharp or gradual turns, climbs grades to 30%.

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN



• Artist's conception of Hungry Horse Dam, another giant of the Pacific Northwest to be built near Kalispell, Montana, by the Bureau of Reclamation. Preliminary studies, subject to change, indicate the dam will be between 340 and 350 feet high and will contain between two and three million cu. yds. of concrete. It will store between 1,000,000 and 3,500,000 acre-feet of water, depending on its height, and support a total power installation of between 179,000 and 286,000 kw.

Shots from the Firing Line

(Continued from page 642)

engineers are included with provisions for master mechanics, machinists and electricians. In the approval are various senior and chief clerk classifications, equipment and truck operators, maintenance superintendents, storekeepers, informational representatives, accountants, special masonry, paint and carpenter crew foremen.

The program will grant veterans an opportunity to come into the Department of Highways and obtain training which will fit them for the professions included in the work of building and maintaining highways in Kentucky. At the same time, additional pay will be provided under the law authorizing the program to make 'on-the-job-training' very attractive to the veteran.

Veterans already in the employ of the Department will be permitted to apply for the certificate of eligibility and enter the on-the-job-training plan.

Private Motor Vehicle Registrations are Higher

Despite limited production of new cars, the number of privately-owned motor vehicles registered during the current year will be substantially greater than 1945 registrations, according to estimates made by the Public Roads Administration of the Federal Works Agency, based on reports from State authorities.

Truck registrations will reach an estimated total of 5,423,000, an increase of 588,000 or 12.2 per cent over 1945 registrations, and approximately 563,000 more than the number registered in 1941, the prewar peak year for motor vehicle registrations.

Automobile registrations are expected to increase from 25,691,434 in 1945 to an estimated 27,088,000 in 1946, a rise of 5.4 per cent, but will be about 2,436,000 or 8.3 per cent, fewer than the 29,524,101 cars registered in 1941.

California, with an estimated total of 2,955,000 privately-owned vehicles to be registered in 1946, and New York, with an estimated total of 2,560,000, will lead the States in motor vehicle registrations. Pennsylvania will be third with an estimated 2,075,000 registrations. Thirteen States will have increases over 1941 registrations.

These figures do not include approximately 115,000 buses expected to be registered this year.

Award Medal of Merit to MacDonald, PRA Head

President Truman awarded the Medal of Merit to Thomas H. MacDonald, Commissioner of the Public Roads Administration, Federal Works Agency, in recognition of his outstanding services during the war.

Major General Philip B. Fleming, Federal Works Administrator, made the presentation to Mr. MacDonald for the President during ceremonies in General Fleming's office before a group of officials and friends.

The citation accompanying the award read as follows:

"To Thomas H. MacDonald, for exceptionally meritorious conduct in the performance of outstanding services to the United States from December, 1941 to June, 1946. Mr. MacDonald, Commissioner of the Public Roads Administration of the Federal Works Agency, had envisioned, even before the war, the importance of highways to military operations, and under his energetic leadership, 78,800 miles of strategic highways were created and maintained. He effectively mobilized the highway forces of the Nation and the States in behalf of the war effort, building thousands of miles of access highways to industrial plants, sources of raw material, and military establishments for the swift movement of munitions, troops and military equipment.

"Under his vigorous leadership civil-

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ROCK GRAB
That Could
Lift a
Tank Car

NOT that you would ever want to use it to lift 20-ton tank cars, but this Bucyrus-Erie Rock Grab does have the strength, the jaw opening and the gripping power to do the job — and to do your job of rock handling quickly, surely, safely. Whether you use the 20-ton size, or the 15, 10, 5, or 2½, you get the same ability to pick up cut stone or rock with a sure, firm grip, and place it just where it is wanted . . . Gripping entirely by pressure and friction, this modern Rock Grab eliminates dog and chain or sling lift methods, saving time and slashing rock handling costs. Write for further information.

7R46C

BUCYRUS-ERIE COMPANY SOUTH MILWAUKEE WISCONSIN

ian forces cooperated in the construction of the Alaska Highway. Under his direction flight strips for the use of military aircraft were built, as well as the Trans-Isthmian Highway. Other types of invaluable service were rendered to the Army, Navy and other war agencies in connection with wartime highway transport, thus contributing to the successful conclusion of the war."

Commissioner MacDonald, who has headed Public Roads since 1919, holds the Cross of the Legion of Honor from the French Government, is a Knight of the First Class of the Order of St. Olav, an investiture made by the King of Norway, and he is a foreign member of the Masarykova Akademie Prace by appointment of the Czechoslovakian Government.

Columbia Basin Aggregate Job Goes to H. F. Green Co.

H. F. Green and Company, Spokane, was low bidder at $373,612.50 for preparing concrete aggregates for the Columbia Basin Project construction program in the Stratford - Adrian - Soap Lake area of Grant County, Wash. Thirteen firms submitted offers for the work which involves 120,000 cu. yds. of stripping overburden, and the preparation and stockpiling of 170,000 cu. yds. of sand and 295,000 cu. yds. of coarse aggregates.

Other bidders and the amounts: Miles Company and Woodworth & Company,

• Soil along the route of the principal canal for the 5,397-acre Pasco unit of the million-acre Columbia Basin Irrigation Project in south-central Washington is so dry that it must be soaked with water before it can be compacted into canal embankments. In this picture, taken 14 miles northwest of Pasco, W. B. Rogers, concrete and pipe foreman for the contracting firm of J. A. Terteling & Sons, Boise, Idaho, determines how deeply the water from the sprinkling system has penetrated.

Bureau of Reclamation Photo

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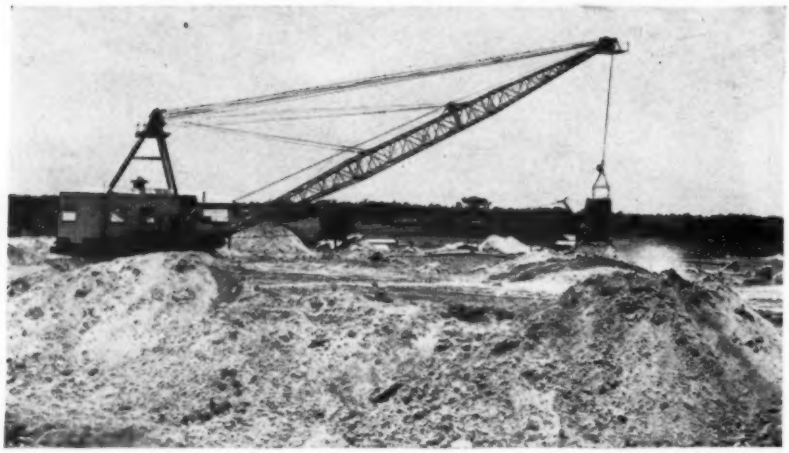

• **Coronet Phosphate Co., Plant City, Fla., uses Bucyrus-Monighan walking dragline with 7 cu. yd. bucket on a 140-ft. boom to strip overburden from phosphate deposit.**

Tacoma, $735,150; Max J. Kuney & Company, Spokane, $645,750; J. G. Shotwell, Albuquerque, N. M., $669.750; C & F Trucking & Contracting Company, Butte, Mont., $538,200; J. A. Terteling & Sons, Inc., Boise, Idaho, $547,500; Colonial Construction Company, Spokane, $598,900; Sather & Sons and Curtis Gravel Company, both of Spokane, $438,000; Winston Brothers Company and Utah Construction Company, both of San Francisco, $552,900; E. B. Bishop, Orland, Calif., $570,750; Millay & McBride Co., Denver, Colo., $463,050; M. E. Nelson Construction Co., Ephrata, Wash., $557,350; and F. R. Hewett Co., Parkwater, Wash., $628,500.

R. B. Williams, acting supervising engineer for the Bureau of Reclamation, who opened the bids, said the materials will be used in building portions of the Main Canal, the East Low Canal, and the West Canal, which will serve the gigantic irrigation system in south-central Washington.

Newcomer to Work on Venezuelan Irrigation

Albert W. Newcomer, engineer in the Branch of Design and Construction at the Denver office of the Bureau of Reclamation, has gone to Venezuela where he will spend a year recommending reclamation practices and techniques. He will investigate suitable locations for reservoirs and other construction for irrigation, flood control, and hydro power.

Commissioner of Reclamation Michael W. Straus designated Newcomer for the assignment, following a formal request by the Venezuelan Government to the Department of State. Mr. Newcomer will serve as consultant to the Venezuelan Government, and will be assisted by a staff of Venezuelan engineers.

In a conference with Bureau of Reclamation officials, Pedro I. Aquerrevere. financial counselor of Venezuelan embassy, explained that his country is now engaged in long-range planning to develop its agricultural resources.

The major part of the investigations which Newcomer will carry on will be in an area in the Northern part of the country, east and west of Lake Maracaibo. The area is considered fine agricultural land, but greatly deficient in moisture. Mountain streams will be utilized to provide water and, at the same time, will be harnessed to prevent recurrent destructive floods. The valley of the Orinoco also will be studied for possible irrigation developments.

Mr. Newcomer, in discussing his as-

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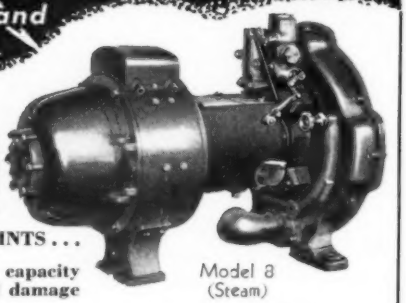
MOON Generators TURBO and BELT DRIVEN for LIGHT and POWER



Model 8 (Steam)

Important MOON *features include:*

GOVERNOR AND COMPOUND WINDING on Steam-driven models prevent excess voltage output which might injure electrical apparatus . . .

ONLY 2 EASY-TO-REACH OILING POINTS . . .

AUTOMATIC CUT-OFF on larger capacity Steam-driven models prevents overload damage to generator . . .

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For *53 years* MOON generators have given dependable service the world over on *Steamships — Tugboats — Dredges* — and other Marine equipment; *Railroad Locomotives; Oil Field Equipment; Cranes, Derricks* and other construction and road-building machinery. Models from 1 to 7½ KW capacity.

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LOADABILITY — Fast, comparatively easy loading due to extremely low height of deck.

HAULABILITY — Light but strong construction permits fast travel at less cost.

BRAKEABILITY — Air or vacuum brakes capable of sure, safe stops under all conditions are available.

EXPERIENCE builds 'em . . .

ROGERS BROTHERS CORPORATION

136 ORCHARD ST. • ALBION, PA.

PERFORMANCE sells 'em . . .

signment, pointed out that irrigation is now practiced in Venezuela, but that it is planned to double the area under irrigation.

Venezuela is about the size of Texas and Louisiana combined, but the country is mountainous in the North, has vast stretches of desert and jungle land, and other areas that are wet for a long part of the year.

Forecast Housing Supplies to Remain Short in 1947

The Construction Division, Department of Commerce, in sizing up the nation's housing and nonresidential construction program for the remainder of 1946 and for 1947, forecast that supplies of lumber, cast iron soil pipe and plumbing fixtures would remain short during 1947.

Brick, tile, concrete block, clay sewer pipe, warm air furnaces and cast iron and convector radiation—all items that have been short—are now being produced in such quantities that the supply is approaching a balance with demand.

Basing its forecast on the Veterans Emergency Housing Program as revised July 29, 1946, and the latest dollar estimates of nonresidential construction, the Department of Commerce said that lumber consumption, including millwork and flooring, for the last half of 1946 and for all of 1947, would total 37¾ billion board feet.

Consumption of cast iron soil pipe for the same period was estimated at 947,642 tons; cast iron and steel bath tubs, 2,518,000; sinks, 3,771,000; lavatories, 3,457,000; and water closets, 3,563,000.

These estimates of consumption represent quantities of materials actually required to be put in place, the Department of Commerce said, and do not include necessary inventory build-up. Therefore, they are substantially below the production levels actually necessary to carry out the estimated dollar volume of construction.

The Veterans Emergency Housing Program contemplates 1,200,000 starts in 1946 and 1,500,000 starts in 1947. Of the starts in 1946, the program specifies 838,000 new permanent dwelling units, 100,000 conversions, 212,000 temporary reuse units and 50,000 trailers. The 1947 program of starts calls for 1,450,000 new permanent dwelling units and 50,000 conversion units.

Revised estimates of new nonresidential construction are $4,639,000,000 for 1946 and $7,124,000,000 for 1947. Maintenance and repair construction estimates are $5,150,000,000 for 1946 and $6,075,000,000 for 1947.

Concrete Aggregate Processing at Big Thompson

Processing of concrete aggregates from the Big Thompson Meadows deposit near Estes Park in Colorado, for use in the construction of dams and canals on the Bureau of Reclamation's Colorado-Big Thompson project in Colorado, is now underway. A contract for

A NEW WICO Magneto: XHG...

...for tough, continuous jobs

Tractors, construction equipment, pumps, inboard motors and other small power units with high compression can now be equipped with the dependable high-output ignition supplied by WICO's 1947 XHG magneto. This geared, horizontally-mounted model is available for two, four and six cylinder engines.

The four cylinder model, illustrated above, will succeed the model C. This new magneto weighs a pound less because of its one piece cast aluminum housing and flange, and is ¾" shorter. There are two less bakelite parts, thus lessening the possibility of breakage. Use of a large oilite bushing and a ball bearing guarantee longer life.

Designed by the largest and most experienced manufacturer of magnetos exclusively, this entirely new magneto is the best buy where high output is required for small engines with high compression.

WICO has complete facilities for the design and manufacture of all types of magnetos and maintains an experienced field service organization. For further information write to the Wico Electric Company, West Springfield, Massachusetts.

WICO
THE HEART OF YOUR ENGINE

the work was awarded to the Schmidt Construction Company, Kremmling, Colorado, on its low bid of $99,000.

The contract involves excavation and stripping of the deposit, and preparing and stock-piling sand and two sizes of coarse aggregate. The contractor must wash and screen the raw material, and crush the oversize material into the two sizes to be stock-piled, so as to obtain the maximum yield from the deposit. The work must be completed within 150 days from the time the contractor receives notice to proceed.

Venezuela To Spend Over Two Million for Equipment

Approximately $2,100,000 will be spent for new machinery and trucks by the Venezuelan government to use on public works projects. The government recently allocated $12,000,000 for public works, most of it for highways, irrigation, water and drainage, and is planning further allocations. Most of the machinery will be purchased in the United States.

Whatever the type of jack, a Simplex is safer and easier to operate.

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WORLD'S MOST COMPLETE LINE OF
JACKS
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OBITUARY

MR. E. J. KRAUSE

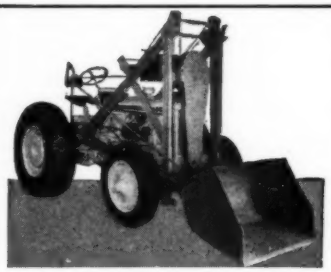
Mr. E. J. Krause, president of the Columbia Quarry Company since its organization in September, 1906, died September 30. Funeral services were held in St. Louis on October 2.

Mr. Krause was a past president of the National Crushed Stone Association and was a member of the board of directors of that organization. He was also a member of the board of directors and executive committee of the Agricultural Limestone Division of the National Crushed Stone Association. For many years he was president of the Midwest Agricultural Limestone Institute. For the past 30 years he devoted a great deal of his time to the advancement of agricultural limestone for farm use, and was considered one of the national chief authorities on this subject.

Mr. Krause was born in Chicago in 1871 and moved to St. Louis with his parents when he was about three years old. He is survived by his daughters, Mrs. Paul E. Lau of Grosse Point, Mich., and Mrs. Robert B. Haas of Columbus, Ohio, and three sons, E. J. Krause, Jr., of Beverly Hills, Cal., and Horace C. and Charles H. Krause of St. Louis, Mo. Another daughter, Mrs. Leighton Shields of Boston, Mass. is deceased.

Start Statewide Drainage Program in Louisiana

The first project of a statewide drainage program for the state, and recommended by the state department of public works, gets under way with the awarding of a $246,996.08 contract to B. Lewis of Eunice, La. The contract calls for the removal of 2,153,700 cu. yds. of dirt, and scheduled to be completed within 15 months. In order to complete the project in that length of time crews will work both day and night. This project will be a system of drainage canals, located in Pointe Coupee parish.



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Backfiller Blades

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On most jobs When Excavating is Necessary

You'll most likely come face to face with one or more Owen buckets, should your travels take you to an excavating job.

The reason why is most simple, for consistent superior bucket performance by Owens is responsible for their widespread use and acceptance.

Bring your equipment catalog files up to date NOW by requesting your copy of the latest Owen Catalog.

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NOT in the *Contract*

The little boy awoke at 4 a.m. and asked his mother to tell him a story.

"Just be patient, Junior. Daddy will be home soon and we'll hear a story that'll be a honey."

"Shoe shine, mister?"

"No."

"Shine 'em so you can see your face in 'em."

"I said no."

"Coward!"

Junior: "Pop, when I bring home my report card, why do you always sign it with an X instead of writing your name?"

Father: "I don't want your teacher to think that anyone who can read and write would have a son as dumb as you."

"Last night, when I returned to my hotel room, I opened the door, and there on my bed was the most beautiful girl I ever saw."

"What did you do?"

"What did I do? I called the manager and had her thrown out! What would you do?"

"The same thing you did, but I wouldn't lie about it."

"Hell, yes," said the Devil picking up the phone.

"Doctor, this patient is very irritable and unreasonable."

"Well, your job is to soothe him, nurse. Give him whatever he wants."

"Sir, I'll resign first!"

The couple who decided to drop in on Mr. Smith were slightly amazed when he came to the door dressed in nothing at all except a high silk hat.

"Well," gasped the lady visitor. "Do you always go around the house naked?"

"Sure. Nobody ever comes to see me."

"Then what's the idea of the high hat?"

"Oh, there's always an outside chance that somebody will drop in."

Lazy Husband: "I see there's a talk of another strike."

Wife: "Yes, and if you was 'arf a man you'd get a job an' be able to go on strike, too."

Joe: "For months I couldn't discover where my wife was spending her evenings."

Moe: "How'd ya find her?"

Joe: "One evening I went home and there she was."

"That man over there is annoying your wife."

"Why he isn't even looking at her!"

"That's what's annoying her."

"Well, Pat," said the friend at the bedside of the dying Irishman, "have you made your peace with God and denounced the devil?"

"Shure, and I've made my peace with God, but I'm in no position to antagonize anybody!"

Farmer: "You can't go wrong on this mare, sir. She's sound, gentle, a good worker and a fine saddle horse."

City Slicker: "What I want to know, is she tender?"

"So you lost your poor husband. I'm so sorry. How did it happen?"

"He was keelt by a weasel."

"Killed by a weasel? That's very unusual. How did it happen?"

"Is driving hotomobil. Is commeeng to railroad crossing. Deedn't hear no weasel."

"No, No! It goes to the building on the OTHER side of the house!"

San Diego Aqueduct

(Continued from page 609)

tanks and repair units. A fuel truck serviced the equipment with diesel fuel and gasoline at the site of the operation; consequently, no time was lost in unproductive travel between the shops and the site.

In order to complete the work on schedule it was deemed advisable to operate two eight-hour shifts, six days a week. Night operations were made possible with the aid of portable light plants and a light circuit consisting of 60-foot poles every 200 feet with four 1,000-watt lamps on each pole. Power was brought in by the contractor from a substation about a mile away.

Approximately 1,250 cu. yds. of concrete will be used in the diversion, inlet and outlet structures which will contain two venturi sections and electrically-operated gates to regulate the flow through the pipe line.

The reservoir will receive the Colorado River water through a 2.6 mile long eight-foot diameter concrete pipe line connecting with the Los Angeles Metropolitan Water District at the west portal of the San Jacinto tunnel. Fifty million gallons of water daily will flow 71.57 miles through a six-foot diameter pipe line from San Jacinto to San Diego's San Vicente Dam. Between the terminals there is a drop of 750 feet in elevation which will permit the water to flow the entire distance by gravity alone, thus eliminating the necessity for pumps. To permit 77½ cu. ft. of water to pass through the line each second will require 2⅓ miles of 96-inch pipe, 8½ miles of 72-inch pipe, 32½ miles of 54-inch pipe, 22½ miles of 48-inch pipe, and one mile of 42-inch pipe. A Bucyrus-Erie 54-B diesel crane equipped with 60-ft. standard boom and standard mounting with 36-inch tread was used to lay the 2.6 miles of 96-inch precast 20-ton sections of concrete pipe.

More than four miles of the aqueduct will be tunnels, the longest of which will be 5,300 feet. The concrete pipe must withstand the pressure of a 400-foot head, and when the waterline is forced underground to underpass rivers, steel pipe capable of restraining even greater pressure will be used.

In addition to the Guy F. Atkinson Company contract, other contracts for the drilling of tunnels

• Crane sets another section of pipe in line.

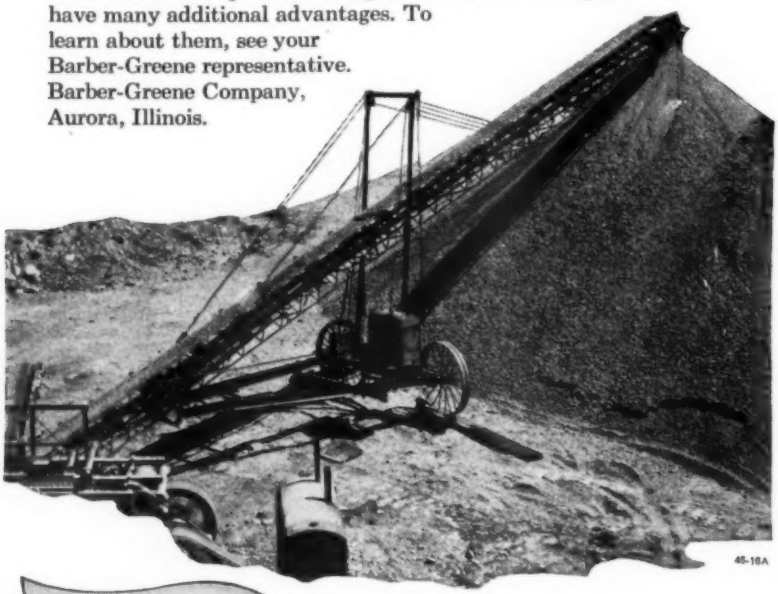
Why B-G Portable Conveyors Do So Much—For So Little

• B-G portable belt conveyors keep materials on the move at a constant flow that means high daily capacity wherever they're put to work.

They can move all over the job, the quarry, the supply yard—stock piling and loading everything from sand to cement, crushed rock to coal.

Shortened or lengthened by the addition or removal of sections, these B-G pre-engineered conveyors are highly flexible in application. They often eliminate the need for costlier permanent installations. Yet, wherever they are used, their low power requirements and simplicity mean lowest yardage costs!

Barber-Greene portable and permanent belt conveyors have many additional advantages. To learn about them, see your Barber-Greene representative. Barber-Greene Company, Aurora, Illinois.



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B-G Barber-Greene CONSTANT FLOW EQUIPMENT

and the laying of concrete pipe have been awarded to the W. E. Callahan Construction Company of Los Angeles; the S. A. Healy Company of Chicago; the Concrete Pipe Contractors of Los Angeles and the United Concrete Pipe Corporation and the Haddock Engineers, both of California. The entire 72-mile project will cost approximately $14,500,000.

Project manager on the reservoir contract is A. H. Steiner and A. G. Chaussee is the project engineer. They also filled the respective positions on the Navy Ammunition Supply and Net Depot, Seal Beach, California.

Other key men in the Guy F. Atkinson Company organization responsible for the construction are Assistant Project Manager L. G. Fassett, Office Manager Thomas F. Foran, Office Engineer Joe B. McNabb, Paymaster P. K. Mitchell, Master Mechanic Bruce Wheeler, Carpenter Superintendent Fred Jordan, Warehouseman C. V. Thompson, and Shift Superintendents F. C. Jackson and Walt Hill.

The entire 72-mile project is under the direction of Navy Engineer Captain Alden K. Fogg, Eleventh Naval District Public Works Officer. Commander Robert D. Thorson is in charge of the Navy Division Field Office at Vista, California (the center of project operations), with Lt. Comdr. F. M. Hines Resident Officer-in-Charge of Construction and R. B. Ward representing the Bureau of Reclamation.

Soil Auger

(Continued from page 617)

equipped with 11-inch and 22-inch bits, was mounted on a 1½ ton 4 x 4. This drill, which will go down 18.5 feet, was handled by a crew of three—one operator and two laborers. Samples of the material taken from various levels were saved for laboratory testing. The 22-inch holes went down at an average of 16 feet per hour, at a cost of $1.50 per foot, compared with $10 per foot for the hand-excavated pits.

After a hole was drilled, the geologist, going down a rope ladder attached to the bumper of a jeep, logged it in much the same manner as large-diameter core holes are logged. The jeep then back-filled the hole with the little Fresno scraper.

The principal advantage of the drill is its speed and low cost per foot of hole. However, cramped quarters in the hole interfere with the geologist's examination to some extent. And it is necessary to scrutinize the sides of the hole very carefully to detect contamination of the natural material caused by passage of the bit. Obviously, use of this power auger cannot entirely replace hand-dug test pits. But where quick information is wanted on comparatively shallow holes, and undisturbed samples are not needed, it offers an economical and efficient means of getting the data required.

The Friant-Kern Canal is a unit of the Friant Division of the Central Valley Project and is under the direction of R. K. Durant, construction engineer.

SPEED UP CONSTRUCTION WITH HEAT!

The Herman Nelson Self-Powered Heater cuts winter "waiting-time"

can be used for:

SPACE HEATING of temporary buildings, storage sheds, repair shops, buildings under construction.

PREHEATING engines and all kinds of mechanical equipment.

SPOT HEATING of materials, workmen, machinery, storage tanks, tools.

THAWING frozen areas and machinery, wheels, gears, transmissions, caterpillars, etc.

VENTILATING and heating of manholes, tunnels, box cars, ship holds, confined areas of all kinds.

DRYING and curing of materials, plaster, paint, mortar, concrete, etc.

Now, for the first time, you can have an independent source of QUICK HEAT — LOTS OF IT, to carry you through many a winter emergency. No more cold weather delays. No more wasting of time. This amazing new heater turns out volumes of fresh, heated air within minutes — enough to heat three ordinary five-room houses! Burns gasoline by an entirely different and safe method. No soot. No smoke. No open fires. Simply designed and easily operated. Requires a minimum of attention. The Herman Nelson Self-Powered Heater is a completely self-contained, portable unit — utterly new in principle. Can be easily moved from place to place on the job—by one man.

THE HERMAN NELSON CORPORATION MOLINE ILLINOIS

FOR 40 YEARS MANUFACTURERS OF QUALITY HEATING AND VENTILATING PRODUCTS

Notes from the manufacturers

Independent Pneumatic Tool Co., Chicago, manufacturer of "Thor" tools, announces the opening of a branch sales office in St. Paul, Minn., located at 220 West Seventh Street. The new office will serve all of Minnesota, the eastern portions of North and South Dakota, northwest portion of Wisconsin, the upper peninsula of Michigan, and will be managed by Joseph A. Bell, for the past six years sales representative of the company in that area.

Worthington Pump and Machinery Corporation, Harrison, New Jersey, releases information that the American Air Compressor Corporation, North Bergen, N. J., has recently signed a contract with them for the exclusive distributorship of Worthington-Ransome construction equipment for northern New Jersey.

Gar Wood Industries, Inc., Detroit, has expanded its manufacturing facilities by purchasing from the War Assets Administration the former Bendix plant in Wayne, Mich. The company will transfer all its Detroit operations to the new site with the exception of its body plant. The new plant contains 236,500 sq. ft. of factory space and 35,000 ft. of office space, and is located on a plot of 37 acres on the outskirts of Wayne within 45 minutes of downtown Detroit.

Goodyear Tire & Rubber Co., Akron, Ohio, through J. A. Bailey, South-central manager, has made the following changes in personnel: W. A. Lovett, San Antonio, Texas, district manager since 1943, has been named New Orleans district manager, succeeding R. J. Thoman who resigned to enter business for himself.

L. W. C. Dye, assistant district manager at Kansas City, has been promoted to manager of the San Antonio district. Replacing Dye at Kansas City is O. S. Whitaker formerly with offices in Dallas, Texas.

Davey Compressor Co., Kent, Ohio, has appointed Wabash Equipment & Supply Co., Indianapolis, Ind., as distributors

The Timken Roller Bearing Co., Canton, Ohio, announces that their Steel and Tube Division has appointed the following three district sales representatives. Sherman R. Lyle, Canton; William E. Bryden, Akron; and Alfred J. Kinnucan, Philadelphia have been assigned the Cleveland, Chicago, and New York districts respectively.

John A. Roebling's Sons Co., Trenton, N. J., have promoted Forest S. Burtch to manager of sales, Wire Rope Division, and William Hobbs, Jr., to manager of sales, aircord division. Burtch succeeds Earl N. Graf, recently resigned.

International Harvester Co., Chicago, related recently through W. C. Schumacher, general manager of the company's motor truck division, that new motor truck production has fallen far short of potential production capacity for 1946 though production had measurably exceeded the 1941 average.

American Chain & Cable Co. Inc., Bridgeport, Conn., has appointed Emerson H. Todd sales manager of their American Cable and Hazard Wire Rope Divisions to succeed Frank W. Bemis who resigned to enter another line of business in Omaha, Neb. Todd, who has been with the company since 1925, will make his headquarters at Wilkes-Barre, Pa.

George Gunther, who has recently returned to the company from service, has been appointed Chicago district manager for the wire rope divisions succeeding Todd

Beckwith Machinery Company, Pittsburgh, Pa., announces the addition of Goodyear Tires to the list of products which it is now distributing. Stocks of Goodyear Earthmover tires will be carried in Pittsburgh and the branch warehouses in Harrisburg, Wilkes-Barre and Bradford.

What Determines a Winner?

In football, it is the ability to "carry the ball" against all counter efforts of the opposing team; in Wire Rope, it is the ability to withstand the ravages of wear, tear and bending stresses—*tough opposition at all times!*

For over 66 years, "HERCULES" (Red Strand) Wire Rope has proved its capacity for getting the job done . . . that's why it is *so regularly* selected for *so many* heavy duty assignments.

Made in Round Strand and Flattened Strand construction—Preformed and Non-Preformed—there's a correct type for your every requirement . . . an important factor if the most *economical* results are to be had.

Your inquiries are welcome, and we invite them.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS 12, MISSOURI, U. S. A.

NEW YORK 6 . . . 90 West Street
CHICAGO 7 . . 810 W. Washington Blvd.
DENVER 2 . . . 1554 Wazee Street

SAN FRANCISCO 7 . . 520 Fourth Street
PORTLAND 9 . . . 914 N. W. 14th Avenue
SEATTLE 4 . . . 3410 First Avenue South

TO ADVERTISE: All advertising in this section is payable in advance. Rate: 60c per line, or $7.20 per inch of 12 lines. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

Immediately available 80 ft. boom stripping shovel type crane, caterpillar mounted, electric, good condition, subject inspection, central location. Box 3186

Bucyrus 175-B Steam Shovel. Serial No. 1478, 3½ cu. yd. dipper, 48' dipper stick, 75' boom, 20" diameter circle rail, hoist engine 12" x 14", boom and swing engines 8" x 8", railroad truck type mounting, 4 trucks, 30" gauge 17' 6" center. The machine is equipped with oversize mother hubbard railroad locomotive boiler with large fire box for lignite fuel, 135 lbs. steam. The boiler may require some new flues. The machine had $21,000 rebuilding since last used. In first class mechanical condition. Shipping weight 200 tons. Located adjacent to railroad track. Dismantling and loading estimated 6000 man hours. Common labor 50c per hour. Billing point intrastate—Sandow, Texas, interstate—Marjorie, Texas. Price as is $3500.

Bucyrus 320-B Steam Shovel. Serial No. 4212, 8 yd. dipper, 74' dipper stick, 85' boom, railroad truck type mounting, standard 320-B Johnson Brothers boiler. New center casting and one-half set new flues included. Machine needs some repairs which can be made easily during erection. Located adjacent to railroad tracks Sandow, Texas. Billing point intrastate—Sandow, Texas, interstate—Marjorie, Texas. Price $6000 as is. Box 3185

Electric dragline 200' boom 20 yd. bucket. Box 3181

Used Marion Model 350 electric shovel reasonably priced, central location with stock of spare parts. Box 3167

52-B Bucyrus-Erie electric combination crane, shovel and dragline in operating condition complete with buckets, fairlead, booms and spare parts. Offered where is, as is, located at St. Cloud, Minn.

SHIELY-PETTERS CRUSHED STONE CO.
P. O. Box 169—St. Cloud, Minn.

For Sale or Rent

Two new two-yard Blaw-Knox clamshells.
Two new 40 ton American block hooks.
Box 3183

One 2¼ yd. Williams heavy duty dragline bucket, complete. In good condition. The Belden Brick Company, Canton, Ohio

For Sale—

SHASTA DAM
AGGREGATE PLANT AND
CONVEYOR EQUIPMENT

INCLUDING:

Late model GE motors, 200 hp., 1800 rmp., 2300/4000 volt, slip ring; complete with interlocking controllers.

Western gear reducers, 200 hp., 40 to 1 ratio, herringbone gears.

8' x 12' Marcy rod mill, complete with drive and spare set of new manganese liners.

Dorr hydroseparator, 20' x 4', complete with drive unit.

8", 16" and 20" deepwell turbine pumps and one 3" x 4" two stage high head centrifugal pump. All complete with motors.

30" Bodinson tripper and trestle.

Misc. electrical equipment and supplies.

COLUMBIA CONSTRUCTION CO., INC.
Box 579 Redding, California

SURPLUS DIPPERS FOR BUCYRUS-ERIE SHOVELS

2—⅜ cu. yd. Skimmer Scoop Dipper—10-B.
2—½ cu. yd. Drag Shovel Dipper—17-B.
3—½ cu. yd. Skimmer Scoop Dipper—17-B.
1—¾ cu. yd. Welded Dipper—21-B.
1—1¼ cu. yd. Drag Shovel Dipper—38-B.
1—1½ cu. yd. Heavy Duty All Cast Dipper 42-B.
1—1½ cu. yd. type 4 Med. Duty Dipper.
1—2 cu. yd. Rock Dipper—75-B.
1—3½ cu. yd. Coal Loading Dipper—75-B.
1—4 cu. yd. Type IV Medium Duty Dipper 100-B.

F.O.B. Works

Write for any further information desired

BUCYRUS-ERIE COMPANY
Parts Department
South Milwaukee Wisconsin

New

DERRICKS

(ALL-STEEL, STIFF-LEG)

7 Available!

From U S. Government Surplus. 30 Ton at 38 ft. radius; 60 ft. Boom with Bull Wheel.

Priced At a Saving!

■

FURNIVAL MACHINERY COMPANY
54th and Lancaster, Phila. 31, Pa.
TRinity 7-5200

3 yd. Walker drags., elec. and diesel.
2 yd. diesel drag., on trucks, 100' boom.
50-B diesel crawler type crane, 50' boom.
Athey Mobiloader for D8 or RD8 Cat. tractor.
75 H.P. 3 drum elec. hoist. misc. derricks.
50 ton steam locomotive, new 1943. A-1.
Misc. asphalt plants; Adnun pavers, etc.
Drag scrapers and slackline excavators.
WANTED—Offers of good used equipment.

James Wood, 53 West Jackson, Chicago 4, Ill.

Surplus Hydraulic Press Stock Available For Immediate Shipment.

4 Beco Portable Hydraulic Presses — 100 tons capacity consisting of: Press cylinder (ram), 4 speed pump with high pressure globe valve, 5' 0" high pressure hose, 5' 0" oil return hose.
3 100 ton Press Frames, including:
1 Frame head
1 Cylinder back plate
4 Alloy steel back plate rods, 1" x 20" with 8 nuts
1 Frame base with tie rods and nuts
4 Alloy steel frame rods 1" x 48" with nuts
2 Extension sets, consisting of:
4 Sprocket lugs
4 Rod connectors
4 Extension rods, 24" with nuts
4 Extension rods, 38" with nuts
4 Extension rods 48" alloy steel, with nuts.
1 Frame for track repair work consisting of:
1 Special back plate
3 Rods with nuts to attach press cylinder to track press frame
2 pcs. 10' 0" High pressure hose with fittings for 100 ton Press.
9 Pressure gauges

Bucyrus-Erie Company
South Milwaukee, Wisconsin

Clamshell and Dragline Buckets New and Used—We Have the Bucket For Your Job.
Phone — Wire — Write

THE BUCKET MART
1150 North Branch Street
Chicago 22, Illinois
Phone Michigan 1515

1 Allis-Chalmers HD-14 tractor, 1941 model, with double drum power unit and 10' Buckeye cable control bulldozer. Good condition and with some new parts.
1 Western Iron Works model 5 rooter.
1 Le Tourneau LP 12 yard cable control scraper. In perfect condition. One extra tire.
All of the above equipment is available for inspection 10 miles south of Marshall, Texas, on Highway 31. E. F. Bolander, Box 229, Marshall, Texas. Superintendent.

McAlester Fuel Company—Box 783
McAlester, Oklahoma—Phone 505

PAGE DRAGLINE BUCKET ONE CU. YD.
Excellent condition $350.00

Surplus, New Wire Line Improved Plow Steel, ¾" size 6 x 19 reg. lay. 1000' or 1100' reels at 18c ft.

G. W. Kaufman
Markley Road, Cincinnati 30, Ohio

Six booster clutch springs for Bucyrus-Erie 16-B. Rhoades Construction Co., Newton, Kansas.

2 Bucyrus-Erie type AX dragline buckets 1 cu. yd. capacity perfect condition, ½ price.
1 Bucyrus-Erie 1½ cu. yd. backhoe attachment complete like new, for use on Bucyrus-Erie 29-B and 33-B.
1 Bucyrus-Erie P-22 double drum power control for use on International TD-9 tractor.

The Lorenz Equipment Company
547 W. Rich St., Columbus, Ohio

1 slightly used complete shovel front and backhoe attachment for Northwest model 25 machine 6533.
1 new shovel front, rope crowd, from Lorain 40 machine 9533. Box 3187

(For Sale continued on page 656)

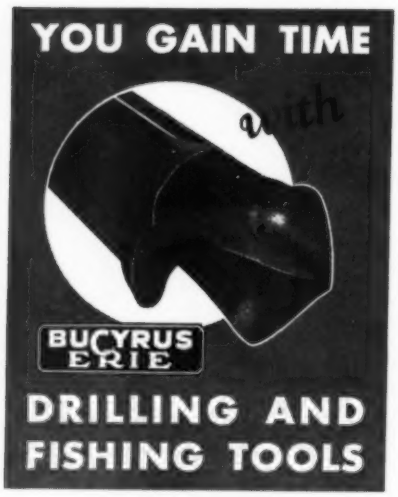
For Sale

(Continued from page 655)

1 Bucyrus-Erie ¾-yd. Dozer-Shovel attachment for TD9 Int'l. Harvester tractor, new.
1 skid mounted Skagit winch, double drum, 146,000 lbs., No. 4 speed low gear bare drum, model BU-410-YD, 2 niggerheads, new.
1 centrifugal Allis-Chalmers water pump, type SSDHB, model MBK, 2" suction, 1½" discharge, Wisconsin 1-cylinder air-cooled engine, new.
1 2-yd. Johnson clamshell bucket, new.
1 1½-yd. Blaw-Knox clamshell bucket, new.
1 ¾-yd Pettibone-Mulliken 6E clamshell, new.
1 ¾-yd. Link Belt medium dragline, new.
1 LeTourneau 5-teeth rooter, 6', used.
1 Mixer, rotary tiller, Seaman model MHD-72, heavy duty, 2 tires trailer hitch, Waukesha engine. Cutting 75" width, with drive from engine through twin disc clutch, front end control, new.

For Rent: 2½ yd. Northwest shovel 1939. Link Belt K580—85 ft. crane.

To be seen at 393 Brookline Street
Newton Center 59, Mass.
R. E. Cunniff, Lasell 4300



. . . because their select steels, expert workmanship, and field-proved designs add up to savings in time and money.

3446

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

Surplus Swivel Hook Double Sheave Blocks

2 10 ton "American" 14" swivel hook double sheave block, diamond pattern with cast steel sheave bushed with self lubricating bronze bushings, grooved for ⅝" rope. Groove diameter 12¼" equipped with 100 lb. cheek weights. 2½" swivel hook. Approximate shipping weight 234 lbs. American Hoist & Derrick Co. Dwg. 1-M-6560.

1 10 ton "American" 14" swivel hook double sheave block, diamond pattern with cast steel sheaves bushed with self-lubricating bronze bushings. Grooved for ¾" rope. Groove diameter 10½" equipped with 100 lb. cheek weights. 2½" swivel hook. Approximate shipping weight 235 lbs. American Hoist & Derrick Co. Dwg. 1-M-6560.

2 40 ton "American" 24" swivel hook double sheave block diamond pattern with cast steel sheaves grooved for ⅞" rope. Sheaves to be bushed with plain bronze bushings, with center bored sheave pin and ¼" Alemite hydr. grease fitting No. 1930 equipped with 300 lb. cheek weights and 5½" swivel hook. Total weight of block 1190 lbs. Dwg. BEFP 1-M-6560.

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

6 No. 65 Caterpillar tractors, new tracks.
6 Athey 3 way dump wagons.
1 International high lift.
1 Caterpillar elevating grader.
4 1½"-5 K. W. lighting plants.
3 G.M.C. water tank trucks.
6 10 ton tandem 6 wheel trucks.
Surplus new parts for tractors and wagons.
All equipment in working condition.
Box 3182

Rope crowd shovel attachment for Bucyrus-Erie 1020 machine. Boom 20', dipper handle 13', ½-yd. plate front dipper. Priced for immediate sale. Box 3164

New 40 ft. clamshell boom for Bucyrus-Erie No. 1030 machine. Complete with double point sheaves and suspension cable sheaves. Price, $660, F.O.B. Tennessee. Box 3175

ENGINEERS AND MECHANICS step up your own skill with the facts and figures of your trade. Audels Mechanics Guides contain Practical Inside Trade Information in a handy form. Fully Illustrated and Easy to Understand. Highly Endorsed. Check the book you want for 7 days' Free Examination. Send No Money. Nothing to pay postman.

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If satisfied you pay only $1 a month until purchase price is paid.

AUDEL, Pub., 49 W. 23rd St., N. Y. 10, N. Y.

New
BUCYRUS - ERIE
PARTS!
From U. S. Govenment Surplus

Parts For: 15B, 20B, 22B, 33B, 37B, 54B, and 120B.

Immediate Delivery From Available Stock. . . . At a Savings While They Last !

FURNIVAL Machinery Company
54th and Lancaster, Phila. 31, Pa.
TRinity 7-5200

4 — 9.00 x 20-10 ply rubber tires complete with wheels for type 36-L Bucyrus-Erie spudder. Tires are in perfect condition having been used to haul spudder a distance of one-half mile from railroad cars to drilling site. Price $350 f.o.b. shipping point in Northern Ohio. Terms — Cash in advance of shipment.
Box 3174

2 — Single rope crowd type shovel front ends for Bucyrus-Erie 10-B machines. Good condition. Box 3176

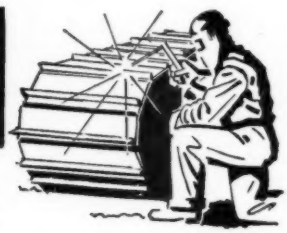
EQUIPMENT WANTED

WANTED
ONE SHOVEL
10 to 30 Yd.
Box 3184

POSITIONS WANTED

Can operate any kind of shovel, dragline, crane or clamshell—steam, diesel, gas or electric. Can do own repair work. Experienced in quarry, ore and coal stripping. Prefer quarry or coal stripping. Familiar with grading work. Will go anywhere. Have release. Box 9254

GIVE EQUIPMENT LONGER LIFE
HARD SURFACE WITH P&H "ABRASOCOTE"



Now! Two brand-new P&H electrodes to give you *longer* lasting surfaces — *less* maintenance costs. Use Abrasocote on parts requiring high resistance to impact and abrasion—and double their lives.

"Abrasocote" is available in two types — Nos. 10 and 20 — to give you the surface hardness jobs require. Easy to use, they operate equally well on AC or DC. Take advantage of their important time, money, machinery saving benefits. Get information from your P&H representative or write us.

General Offices: 4517 W. National Ave., Milwaukee 14, Wis.

"ABRASOCOTE 10"
Harder than No. 20, it's for parts subject to rolling or sliding abrasion, batter and impact. Applications include tractor treads, drive sprockets, cams, crusher hammer, etc. Rockwell C hardness 35-40.

"ABRASOCOTE 20"
For high resistance to impact, heat, corrosion, abrasion. Deposit work hardens under impact. Use on high carbon manganese cast steels. Rockwell C hardness 25-35

P&H also makes other electrodes in all types and sizes—AC or DC — for welding all steels and for building up and hard surfacing.

P&H
WELDING ELECTRODES
HARNISCHFEGER CORPORATION
WELDING ELECTRODES · MOTORS · HOISTS · ELECTRIC CRANES · ARC WELDERS · EXCAVATORS

ACCO-LOC SAFETY SPLICE

No Distortion of Rope Structure

Always 100% Efficient

Note from this unretouched photograph how the six strands of the dead end have been pushed down and locked into place—and how the six strands of the pull or load rope have not been distorted in any way. Such lack of rope distortion would be impossible with the old, obsolete hand-tuck splicing.

When you cut the ACCO-LOC Safety Splice with an abrasive cut-off machine you see, by cross-section, why this new and revolutionary method for making wire rope endings is so efficient. Not the slightest distortion of rope structure; maintains equalized stresses in all strands; no off-center pull on the load rope.

More than being 100% efficient, the ACCO-LOC Safety Splice is safe. No seizing wires to loosen; no wire ends to barb. Extremely flexible and easy to handle. Send today for fully detailed literature.

ACCO Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Emlenton, Pa., Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

This Piece of Rope is Doomed

(NEXT TIME THEY'LL USE IWRC)

IWRC
would have helped
prevent this
An independent wire rope center gives added support to the strands which lie around it.

Too bad. It was a good wire rope, and it could have lived a long, useful life.

Instead, it's doomed to an early scrapping—and all because of crushing on the drum. The crushing was hastened by very poor spooling, which will shorten the life of any rope.

In some rope service, even with the best of spooling, it is difficult to avoid heavy, crushing pressures. But you can help counteract such pressures by purchasing rope with an IWRC (independent wire rope center).

An independent wire rope center is a separate little rope in itself—a rope within a rope. It performs the same duty as the conventional hemp core, but is naturally stronger, less yielding under pressure.

With IWRC, you may sacrifice a minor amount of flexibility. Nevertheless, where the hazard of crushing is present, IWRC should be specified. Under these conditions, it will substantially prolong rope life.

Why not review your roping needs with a Bethlehem engineer? If he finds you need IWRC, he'll recommend it—but only where it will actually work to your advantage.

BETHLEHEM STEEL COMPANY
Bethlehem, Pa.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

When you think WIRE ROPE . . . think BETHLEHEM